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## Article

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## The capital maintenance regime matters for creditors

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### Abstract

Relying on an unbalanced panel of 25,211 observations of Polish unlisted companies for the period 2005–2018, we employ panel data analysis to investigate the role of the capital maintenance principle in securing creditors' interests. We document a persistently higher level of indebtedness among firms that adhere to the capital maintenance regime. Although the strength of the relationship is contingent on debt maturity, capital maintenance is found to be significant for both adjusting creditors, who can adjust the terms of the loan contract correspondingly to the credit risk and non-adjusting creditors. Unlimited liability is shown to eliminate the need to maintain legal capital, thus demonstrating the notable role of legal capital in safeguarding creditors' interests in cooperation with limited liability companies. In contrast to the viewpoint of advocates for abandoning legal capital requirements, we show that legal capital remains an important mechanism for ensuring compatibility in incentives between shareholders and creditors.

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### 1. Introduction

The goal of the article is to investigate whether the capital maintenance regime implemented through share capital increases the ability of companies to obtain external financing. The capital maintenance regime emerged in the nineteenth century in response to growth in “watered stocks,” whose value significantly exceeded that of the underlying companies' assets because of manipulative reporting practices, window dressing, or deceit. Adherence to the capital maintenance regime was supposed to protect investors from such investments (Cook, 1921). Ever since then, the capital maintenance regime has

been incorporated into the regulatory framework and company law across the majority of developed countries, with important intricacies observed in each individual case (Arnold, 2017). The capital maintenance regime is implemented and enforced in different ways within different legal systems (Bachner, 2009). By design, it is supposed to perform the following two functions: (1) establishing the minimum threshold of paid-in equity capital necessary to incorporate a new entity; and (2) curtailing the potential for equity disbursement to shareholders (Armour, 2006). The principle relies on two key concepts: (1) share capital and (2) undistributable reserves. The sum of the two, comprising legal capital, represents an equity buffer (Bachner, 2009), which safeguards creditors' interests and may not be paid out in the form of dividends or share buybacks (Bebchuk, 1992; Panetsos, 2016). Gradually, the capital maintenance regime has been eroded in common law countries but remains important in civil law countries (Armour, 2006). The UK is a fringe case: despite being a common law country, it was forced to adapt its regulatory framework to the

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requirements of the Second Council Directive (77/91/EEC) of December 13, 1976, which urged member states of the European Union (EU) to adopt the legal capital requirements.

The debate over the economic efficiency of the capital maintenance regime and the differences between the Anglo-American and the continental accounting system has a long history and is one of the most controversial issues in European corporate law (Bachner, 2009), which, according to Gelter et al. (2017), developed from the juxtaposition of the company law traditions in the UK to those in Germany. Advocates of the capital maintenance regime postulated that its enforcement protects creditors from excessive distribution of equity capital and plunder by firms (particularly in the event of major consolidations), yielding benefits similar to debt covenants, which are particularly valuable for non-adjusting creditors (Lutter, 2006). Regulatory limitations also reduce the costs of negotiation of credit agreements and protect executives from shareholder pressure to increase payouts (Lutter, 2006). The opponents of the legal enforcement of the capital maintenance regime have stated that limits to payouts and equity disbursement distort financial decision making, which may prevent economically viable transactions from taking place (Ferran & Ho, 2014). Although creditors are encouraged to attend to their interests by appropriately adjusting the conditions stipulated in credit agreements, the ex post constraints imposed on firms' payout decisions should be flexible and rely on solvency tests as a key criterion for alignment between shareholders' and creditors' interests.

The degree of controversy surrounding the capital maintenance regime is so high that the critical stance adopted by some authors has frequently been expressed in emotionally charged terms, with some calling the advocates of the regime adherents of “a religion with few converts” (Chin & Wong, 2002) with views focused on their own financial interests. For example, Enriques and Macey (2001) conjectured that the capital maintenance regime continues to exist in European law despite its seeming rigidity and inefficiency only because of influential interest groups that gain from the legal capital regime. Conversely, Haaker (2012) stated that abandonment of the capital maintenance regime may have serious negative repercussions, weakening capital requirements and creditor protection, especially when a firm is in financial distress (Chu, 2018).

Both sides of the debate have presented compelling arguments (Hopt, 2007): strict adherence to the capital maintenance regime has both advantages and disadvantages stemming from its rigidity. Therefore, flexibility in selecting the preferred legal pathway may represent a solution to the problem. The UK appears to be heading in this direction; in writing about the Brexit wave, Ferran (2019) saw an opportunity to review legal capital in UK law free of pressure from the Second Council Directive.

Because normative debates have failed to yield a definitive answer to the problem of the application of the capital maintenance regime, an expectation has grown that investors, rather than legislators, will resolve the matter (Armour, 2006). At the same time, the theoretical arguments on the topic have been

weakened by the notorious lack of relevant empirical evidence on the role of the capital maintenance regime in modern company law (Haaker, 2012; Panetsos, 2016). Empirical studies have been silent on the importance of the capital maintenance regime for securing creditors' rights and interests. The research gap in this domain is therefore substantial.

The goal of the present study is to close this gap in the literature by investigating the relationship between legal capital adequacy, measured as the proportion of share capital in total equity, and firms' leverage. To that end, we compiled an unbalanced panel dataset covering unlisted Polish companies with limited and unlimited liability during the period 2005–2018. Using panel modeling, the study investigates whether adherence to the capital maintenance regime – that is, refraining from disbursing legal capital and stability in the latter as a percentage of total equity – enhances firms' ability to obtain external financing with different maturities. The empirical findings documented in the study confirm that the capital maintenance regime matters for creditors. We find a robust positive association between the share of legal capital in total equity and firms' leverage. Crucially, we provide evidence that the magnitude of the relationship depends on the debt maturity and shareholders' liability. As expected, we find that the link between legal capital maintenance and leverage vanishes for unlimited liability companies. Therefore, we argue that legal capital acts as shareholders' “skin in the game,” thereby reducing the perceived risk for creditors, whose debt contracts are based on noncontingent fixed debt repayments.

The study contributes to the ongoing debate over the role of legal capital in creditor protection. It supplements the extant literature in the following three ways. First, we demonstrate that, despite the criticism of the capital maintenance regime and the legal provisions that pertain to it, legal capital remains a vital mechanism for aligning shareholders' and creditors' interests. Second, we demonstrate that the scale of the link between adherence to the capital maintenance regime and firms' ability to secure external financing depends on the parameters of the debt contract and on the shareholders' legal liability. Third, we find evidence that legal capital can serve as a useful mechanism for alleviating the degree of binding financing constraints faced by companies, enhancing trust between shareholders and creditors. To our knowledge, this is the first study to provide empirical evidence on the usefulness of legal capital in protecting creditors, conducted until now on the basis of normative findings. This study, however, provides evidence on the effectiveness of capital maintenance in countries with a continental (European) accounting system, such as Poland. It confirms that creditors prefer conservative accounting valuations, as reported by Cascino et al. (2014). This is important as the discussion on the effectiveness of capital maintenance as a mechanism for protecting lenders is still ongoing, especially with regard to the Anglo-American accounting model, which is widespread due to the International Financial Reporting Standards (IFRS) and related fair value accounting (Xiong, 2020). It has accentuated the divergence between accounting profit and distributable profit (Ferran, 2019), which has led to erosion of the principle of capital maintenance due to aggressive

accounting and thereupon the hollowing out of equity capital reserves (Leaver & Murphy, 2021; Xiong, 2020). For this reason, the IFRS and fair value accounting have come under attack for being insufficiently prudent and, therefore, played an unsatisfactory role during the financial crisis (Bowen & Khan, 2014; Ferran, 2019; Sikka & Stittle, 2019). Therefore, many authors have proposed that the principle of capital maintenance be reformed (Fei [2019] and Xiong [2020], writing about China; Leaver & Murphy [2021], about the UK; Autenne et al., [2018], about Europe).

The study is based on empirical data from Polish unlisted small and medium-size enterprises (SMEs). Several characteristics of the Polish economy make it an interesting subject for an empirical study. First, the recommendations of the Second Council Directive are binding for public and nonpublic joint-stock companies as well as for limited liability companies and limited partnerships with shares. Polish companies rely on intermediated rather than direct financing to procure external capital. The overwhelming majority of firms maintain arm's-length relationships with commercial banks (Hasan et al., 2017) to ensure the availability of external capital for investment purposes. The extant literature (Freixas & Rochet, 2008) has shown that, under such circumstances, shareholders' contribution in the form of equity capital represents a crucial element for mitigating banks' lending risks. Second, the majority of corporate clients are serviced by several large commercial banks, which have been shown to curtail lending to closely held SMEs. Finally, Polish companies have been shown to remain financially constrained (Jackowicz et al., 2016) despite decades of rapid development of capital markets and the banking sector. Deficiencies in the country's bankruptcy codes (Staszkiwicz & Morawska, 2019), the relatively slow restructuring processes faced by most companies experiencing financial hardship, the difficulties involved in the repossession of collateral, and the fragility of the overall process related to firms' reorganization and liquidation make Poland an interesting market in which to investigate the role of capital maintenance as a hedging device protecting creditors' interests. The existing inefficiencies in the enforcement of creditors' interests through the legal system may make financial collateral in the form of paid-up equity capital one of the most effective ex ante ways of safeguarding creditors' financial interests.

The remainder of the paper is organized as follows. In Section 1, we present an overview of the extant theoretical and empirical literature on the role of the capital maintenance doctrine in modern systems of creditors' rights protection. We present the research hypotheses in Section 2 and the data collection process and the empirical research design in Section 3. In Section 4, we discuss the key empirical findings along with their implications. Section 5 offers a discussion, and Section 6 lays out a conclusions.

## 2. Literature review and hypothesis development

The doctrine of capital maintenance, which has long underpinned shareholder–creditor relationships at modern

industrial organizations, stipulates that, after a company has received legal equity capital from stockholders for the purpose of carrying out its business activities, it may not disburse it back unless specific preconditions have been met (Armour, 2000). The restrictions imposed on the distribution of available equity capital are meant to protect the interests of creditors, whose payouts are linear and not contingent on debtors' operating performance.

Despite criticism of it, the capital maintenance doctrine remains one of the cornerstones of European company law (European Parliament, 2017). Minimum legal capital requirements are set to align the countervailing interests of diverse groups of stakeholders. The advocates of their preservation in company law argue that legal capital requirements limit the scale of opportunistic behavior by executives, secure additional funding for investment, and provide better employee protection (Ferran & Ho, 2014; Santella & Turrini, 2008). Solvency tests (Heaton, 2007), which are frequently proposed as a substitute for binding minimum legal capital requirements, have been criticized because of their potential disadvantages for creditors. Because the framework for the issuance of solvency test results in some jurisdictions did not mandate the auditing of such results, creditors cannot credibly assess the trustworthiness of this document. In contrast, the enforcement of statutory legal capital requirements is backed by court procedures, increasing their credibility and thus ensuring better protection of creditors' interests. Therefore, paid-up legal capital acts as initial collateral from shareholders to absorb any losses before creditors take a hit and as a signaling tool that helps shareholders to communicate their investment prospects to the market and financial institutions (Freedman, 1994).

Empirical studies (e.g., Duchin et al., 2010; Moshirian et al., 2017) have demonstrated that firms need to possess sufficient collateral if they wish to borrow on capital markets (Woodruff, 2007) or paid-in capital to cover the potential intermittent fluctuation in operating cash flows. Therefore, it is reasonable to expect that a higher value of paid-in legal capital will increase firms' debt capacity by reducing the risks faced by their creditors. At the same time, if the protective role of legal capital has already been assumed by debt covenants and other forms of contractual creditor protection, the relationship between legal capital and firms' ability to procure external financing should be insignificant.

The fundamental premise behind the enforcement of the capital maintenance doctrine in business law is the existence of an inherent conflict of interest between shareholders and creditors (Smith & Warner, 1979). In an attempt to reduce the amount of wealth available for capture by creditors, shareholders may be inclined to push for higher cash payouts to leave an empty shell for potential takeover by creditors (Black, 1976; Jensen & Smith, 1985). Empirical studies have demonstrated that this proclivity is particularly pronounced at financially distressed companies, in which shareholders and creditors effectively compete for liquidation proceeds (Campbell & Frost, 2007).

The principle of shareholder value maximization (Copeland et al., 2000) posits that, to maximize the wealth of firms'

owners, payout decisions should be made to transfer to shareholders funds that would otherwise have been used to service debt. To preclude that possibility, creditors impose stringent debt covenants, which restrict the scope for diverting funds from debt service (Freixas & Rochet, 2008). The most common debt covenants restrict the potential for dividend payouts, share buybacks, mergers and acquisitions, managerial payouts, and the incurring of senior debt (Dichev & Skinner, 2002). Some of them are put in place to mitigate managerial opportunism, excessive risk taking, and inefficient deployment of borrowed funds through ill-conceived investment projects. As the creditors' primary concern is the preservation of borrowers' business viability, restrictions on the implementation of risky growth strategies may prevent managers from gambling on resurrection of distressed firms at the creditors' expense (Décamps & Faure-Grimaud, 2000). Other covenants, such as restrictions on the possibility of incurring additional debt without creditors' approval, pursue the goal of protecting the creditors' position in the pecking order (Chava & Roberts, 2008): incurring senior debt may reduce this likelihood and increase the haircut charged on junior debt. Finally, the restrictions imposed on dividend payouts and share buybacks are put in place to ensure that shareholders' capital involvement in the enterprise is sufficient for incentive compatibility (Xu et al., 2019) between owners and creditors. In conjunction, a set of debt covenants is supposed to mitigate the conflict of interest between creditors and shareholders and maximize the likelihood of timely debt servicing and repayment (Kochiyama & Nakamura, 2021).

The downsides of the strict imposition of debt covenants include limiting the scale of productive investment by debtor firms to avoid a formal breach of contractual covenants or out of fear of the negative short-term consequences of large investment outlays (Silva et al., 2013). The opposite outcome is also possible, in which restrictions on dividend payouts push firms' managers to engage in inefficient and excessive deployment of the available distributable funds in low-yield investment projects (Jung et al., 2016).

The transmission mechanism through which covenants protect the rights of creditors relies on capital maintenance as a means of ensuring that shareholders have enough skin in the game to be discouraged from making decisions that are not in the interests of creditors (Schwert, 2020).

The capital maintenance theory implies that, if legal equity capital remains at a specific stable level, the shareholder–creditor conflict of interest should remain in check. Further developing this line of reasoning, we posit the following research hypothesis, which is the focus of our empirical study.

**Hypothesis 1:** *The maintenance of legal shareholder capital is positively associated with firms' creditworthiness and ability to incur external financing.*

Relative few empirical studies have explored the nexus between capital maintenance and firms' credit capacity (Chu, 2018). Some studies (e.g., Armour, 2006) have claimed that

the concept of legal capital no longer fits the contemporary architecture of creditor–shareholder relationships. Instead, the growing body of diverse debt covenants substitutes legal capital to protect creditors' interests. To secure access to cheap external financing, firms compete in designing debt contracts that offer the maximum possible assurance to credit holders without imperiling firms' flexibility and executive authority in decision making and without dissuading them from taking risk. In turn, in the quest for clients and long-term banking relationships, financial institutions also design less cumbersome and more resilient contracts, to avoid stifling firm growth or interfering in their day-to-day management (Garleanu & Zwiebel, 2009). These competitive pressures are likely to result in the emergence of contractual clauses and covenants tailored to the given client and bank (Demiroglu & James, 2007). Whenever contractual covenants are insufficient, state-level regulations step in to protect the interests of creditors. Hence, empirical studies have demonstrated that, in jurisdictions with weaker protection of creditor rights, contractual clauses limit shareholder payouts (Brockman & Unlu, 2009). In legal terms, companies have found several ways to circumvent the outstanding limitation on shareholder payouts, thus effectively forcing financial institutions to tighten their monitoring and impose increasingly strict debt covenants (Mulbert & Birke, 2002). Because of the inherent rigidity of legal capital requirements and accounting-based shareholder distribution rules, the possibility of substituting a solvency test for restrictive capital maintenance requirements has become the subject of growing discussion (Kuhner, 2006).

Further delving into the intricacies of the interrelationship between legal capital and indebtedness, we split creditors into two groups: adjusting creditors and non-adjusting creditors (Armour, 2006). Adjusting creditors have a business model and scale of capital entanglement with the borrower that assume extensive data collection to facilitate appraisal of credit risk. To protect themselves from default by a counterparty, these creditors develop comprehensive mechanisms for data collection and processing, create models for measuring individual borrowers' credit risk, and adjust the terms of the loan contract correspondingly to enable them to cover this risk. As a result, the cost of debt, maturity, covenants, and other clauses in the loan contracts are tailored to the needs of specific borrowers. By contrast, non-adjusting creditors cannot collect and price credit risk data into loan contracts because of the contingent nature of the creditor–borrower relationship. One of the largest groups of non-adjusting creditors comprises trade creditors—that is, suppliers who allow their customers to defer payment for the goods that they receive. By extending trade credit, these companies perform a role as quasi-financial institutions. At the same time, the payoffs of their loans are uncertain and may fluctuate depending on the customers' credit risk. Because of their lack of bargaining power, suppliers of trade credit may be unable to negotiate the terms in the provision of trade credit (Fabbri & Klapper, 2016), thus becoming non-adjusting creditors.

Recent empirical evidence (e.g., Cantero-Saiz et al., 2021; Kadapakkam & Oliveira, 2021) has suggested that the provision of trade financing by non-adjusting creditors can have serious consequences for their own access to external capital, including bank debt. Although adjusting creditors have covenants, an adjustable cost of debt, and collateral to protect their interests, non-adjusting creditors are in a riskier position, because their payoff ultimately depends on their borrowers' overall financial standing and the availability of internally generated financial resources. In light of this conjecture, we postulate that capital maintenance plays a more important role in protecting the interests of non-adjusting than adjusting creditors.

**Hypothesis 2:** *Paid-in capital adequacy has a stronger relationship to non-adjusting credit provision than to adjusting credit provision.*

Paid-in legal capital is conventionally perceived as a mark of shareholders' "skin in the game"—that is, their material involvement in the company—which acts as a buffer, absorbing possible losses along with other financing parties. It is particularly important in legal forms of business, in which shareholders have only limited liability up to the amount of paid-in equity (Toporowski, 2010). In the presence of limited liability clauses, a lack of sufficient financial involvement with the entity may push shareholders to engage in excessively risky behavior at the expense of other financing parties, notably creditors. An negative investment outcome would then disproportionately affect the party with higher capital investment. To preclude such a possibility, the capital maintenance doctrine mandates that shareholders hold sufficient equity for withstanding possible losses. Thus, under limited liability, we expect to observe a positive link between paid-in legal equity capital and firms' credit capacity. However, this link vanishes if shareholders face unlimited liability. Therefore, we posit the following research hypothesis.

**Hypothesis 3:** *The link between paid-in legal capital and firms' leverage vanishes when shareholders have unlimited liability.*

Together, the three hypotheses give a comprehensive overview of the role of capital maintenance in protecting creditors' interests. They show not only the magnitude of the link legal between equity and leverage but also clarify the mechanism through which this relationship operates.

### 3. Sample description and research method

#### 3.1. Research sample

The study is based on data from the financial reports of Polish companies obtained from the InfoCredit database. The sample encompasses both limited and unlimited liability firms, which operated between 2005 and 2018. Only companies for which we could obtain and estimate all the experimental variables used in the empirical analysis are included in the sample. In the case of partnerships (taxpayers with personal income tax as company income), the sample contains only the financial

Table 1  
Variable definitions.

Variable	Definition
Dependent variables	
D/A	Debt ratio, defined as total debt (the sum of current liabilities and long-term liabilities) divided by total assets
IBD/E	Interest-bearing debt to shareholders' equity ratio
STL/CA	Short-term liabilities (without credit and loans) to current assets ratio
Independent variables	
Ln(Assets)	Natural logarithm of total assets
SC/E	Ratio of share capital to total shareholders' equity
S/A	Ratio of sales to total assets
ROA	Return on assets, defined as earnings before interest and taxes (EBIT) divided by total assets
COD	Cost of debt, defined as financial costs divided by interest-bearing debt
CR	Cash ratio, defined as short-term investments divided by current liabilities
E/FA	Shareholders' equity-to-fixed-assets ratio, defined as shareholders' equity to total fixed assets
GDP %	Gross domestic product (GDP) growth rate, defined as the percentage change in GDP in one year

statements of companies with revenue of more than €800,000<sup>1</sup> in the previous year. Thus, we assume that these companies have survived the startup period.

After calculating the variables according to the algorithms presented in Table 1, we filter the data of any atypical observations. Those with values higher than  $Q3+3 \times IRQ$  and lower than  $Q1-3 \times IRQ$ , in which  $Q1$  is the first quartile,  $Q3$  the third quartile, and  $IQR$  the interquartile range ( $Q3-Q1$ ), were considered atypical. As a result, we obtained an unbalanced firm-year panel dataset with 25,211 firms observed between 2005 and 2018. In later stages of this study, we split the sample into two subsamples: groups of limited and unlimited liability companies (Table 2). The characteristics of the sample are in Table 2 and the number of observations in subsequent years in Table 3.

#### 3.2. Research design

##### 3.2.1. Empirical model

To test the relationship between the equity structure and firm indebtedness, we use the following model:

$$FD_{i,t} = \alpha + \beta_1 SC/E_{i,t} + \gamma Z_{i,t} + \varepsilon_{i,t}$$

where  $FD_{i,t}$  is the indebtedness of firm  $i$  at time  $t$ , measured by  $D/A$ ,  $IBD/E$ , and  $STL/CA$ ;  $SC/E_{i,t}$  is the equity structure of firm  $i$  at time  $t$ , measured by the ratio of share capital to equity; and  $Z_{i,t}$  is a vector of the control variables.

<sup>1</sup> Unlike all limited liability companies and joint stock companies that must maintain full-cycle accounting and reporting regardless of the amount of revenue, pursuant to the Polish Accounting Act, partnerships are permitted not to keep accounting books if their annual business revenue does not exceed €800,000 up to and including 2008, €1,200,000 from 2009 up to and including 2017, and €2 million beginning in 2018.

Table 2  
Sample characteristics.

Group	Limited liability group (LLG)			Unlimited liability group (ULG)		Grand total	
	Legal forms	Joint-stock company	Limited liability company	State enterprise	Limited partnership with shares		Sole proprietorship General partnership Limited partnership
Observations		7271	16,039	25	72	1804	25,211
Assets (thousand PLN)	Mean	316,680.4	95,497.7	997,883.7	187,987.7	49,838.7	157,179.9
	SD	1,967,645.3	254,180.3	1,359,497.6	260,083.9	85,094.4	1,082,287.7
	Q25	19,587.0	16,897.9	13,994.0	40,758.7	13,325.7	17,187.0
	Median	46,351.0	37,089.8	23,420.6	78,818.6	28,625.6	38,619.6
	Q75	117,810.0	83,221.0	2,397,892.0	198,811.0	57,914.8	89,279.0
Share capital (thousand PLN)	Mean	81,612.3	20,293.3	139,677.0	17,812.1	8464.9	37,243.0
	SD	762,668.9	72,219.3	188,163.9	48,922.2	20,675.4	414,667.6
	Q25	960.0	530.0	702.0	1001.6	383.7	622.0
	Median	3248.0	3611.0	3760.0	2855.0	2364.1	3388.0
	Q75	14,332.5	15,047.0	386,188.1	11,447.9	8389.5	14,171.0
Sales (thousand PLN)	Mean	268,998.4	128,362.9	315,211.5	195,065.5	94,434.5	166,871.0
	SD	1,128,070.4	355,832.0	398,889.3	305,536.7	123,912.9	673,413.3
	Q25	23,755.6	21,666.3	22,465.3	54,388.2	24,062.8	22,492.7
	Median	57,276.4	45,816.9	26,386.0	99,374.1	54,846.9	49,195.0
	Q75	150,268.0	109,445.7	746,256.6	152,553.7	115,719.5	120,517.6
Minimum capital requirement (thousand PLN)		500 before 2009, 100 after 2009	50 before 2009, 5 after 2009	none	50	none	

Table 3  
Number of observations in subsequent years.

Group	Limited liability group (LLG)			Total LLG	Unlimited liability group (ULG)			Total ULG	Grand total
	Legal forms	Joint-stock company	Limited liability company		State enterprise	Limited partnership with shares	Sole proprietorship General Limited partnership		
Year	2005	480	960	4	1444	6	106	112	1556
	2006	680	1253	3	1936	8	143	151	2087
	2007	812	1658	3	2473	7	187	194	2667
	2008	567	1275	3	1845	8	145	153	1998
	2009	611	1278	2	1891	6	140	146	2037
	2010	580	1242	3	1825	5	141	146	1971
	2011	589	1295	2	1886	9	156	165	2051
	2012	422	1035	1	1458	4	130	134	1592
	2013	378	908	1	1287	0	103	103	1,39
	2014	383	888	0	1271	0	101	101	1372
	2015	405	1028	1	1434	4	116	120	1554
	2016	371	909	1	1281	5	99	104	1385
	2017	489	1127	1	1617	5	120	125	1742
	2018	504	1183	0	1687	5	117	122	1809
Grand total		7271	16,039	25	23,335	72	1804	1876	25,211

### 3.2.2. Dependent variables

*D/A*: Debt-to-assets ratio.

*IBD/E*: The ratio of interest-bearing debt to shareholders' equity, which shows the amount of debt extended by adjusting creditors.

*STL/CA*: The ratio of short-term liabilities to current assets, which indicates the amount of debt extended by non-adjusting creditors.

### 3.2.3. Independent variables

*SC/E*: The ratio of share capital to total shareholder equity reflects how much of the shareholder equity is share capital, which is subject to distribution restrictions in line with the rules

on capital maintenance. The cognitive value of this parameter varies between limited and unlimited liability companies. In limited liability companies (LLG), the change in the SC is formalized and time consuming and generates costs. It also requires notification to the National Court Register. In contrast, at companies with unlimited liability (ULG), SC (referred to in Polish law as a capital contribution) only reflects the degree of shareholder involvement. It can be changed relatively easily, with no notification to the National Court Register required.

### 3.2.4. Control variables

The model uses the following factors, which are determinants of corporate indebtedness:

Table 4  
Correlation coefficients between variables.

	D/A	IBD/E	STL/CA	GDP%	ROA	S/A	SC/E	KOD	E/FA	CR
D/A	1.000									
IBD/E	0.690 <sup>a</sup>	1.000								
STL/CA	0.141 <sup>a</sup>	0.023 <sup>a</sup>	1.000							
GDP%	0.023 <sup>a</sup>	-0.005	-0.007	1.000						
ROA	-0.041 <sup>a</sup>	-0.069 <sup>a</sup>	-0.135 <sup>a</sup>	0.039 <sup>a</sup>	1.000					
S/A	0.383 <sup>a</sup>	0.109 <sup>a</sup>	-0.159 <sup>a</sup>	0.030 <sup>a</sup>	0.238 <sup>a</sup>	1.000				
SC/E	-0.027 <sup>a</sup>	0.005	0.161 <sup>a</sup>	0.022 <sup>a</sup>	-0.275 <sup>a</sup>	-0.172 <sup>a</sup>	1.000			
KOD	0.021 <sup>a</sup>	-0.196 <sup>a</sup>	-0.045 <sup>a</sup>	-0.067 <sup>a</sup>	0.084 <sup>a</sup>	0.161 <sup>a</sup>	-0.033 <sup>a</sup>	1.000		
E/FA	-0.134 <sup>a</sup>	-0.265 <sup>a</sup>	-0.215 <sup>a</sup>	-0.001	0.233 <sup>a</sup>	0.249 <sup>a</sup>	-0.221 <sup>a</sup>	0.129 <sup>a</sup>	1.000	
CR	-0.408 <sup>a</sup>	-0.285 <sup>a</sup>	-0.050 <sup>a</sup>	-0.019 <sup>a</sup>	0.081 <sup>a</sup>	-0.229 <sup>a</sup>	0.027 <sup>a</sup>	-0.031 <sup>a</sup>	0.115 <sup>a</sup>	1.000

<sup>a</sup> Significant at the 10% level.

*Ln(Assets)*: The natural logarithm of total assets, which proxies for the size of the enterprise (Al-Najjar & Hussainey, 2011; Anginer et al., 2022; Ramli et al., 2019). It is inflated to 2018 PLN by the consumer price index from the Statistical Office, following Flannery and Hankins (2013).

*S/A*: The sales-to-assets ratio, a proxy for the capital intensity of production. The lower the index is, the greater is the capital intensity of production.

*ROA*: The return on assets, which shows profitability but does not take into account the effects of debt and taxes. It indicates the effectiveness of a company's operating activities (Al-Najjar & Hussainey, 2011; Anginer et al., 2022; Moradia & Paulet, 2019; Ramli et al., 2019).

*COD*: The cost of debt, in which a low value makes debt more attractive and increases the chances of a positive leverage effect.

*CR*: The cash ratio, which is one of the determinants of financial liquidity and affects creditworthiness. At the same time, it shows the cash balance held by the enterprise. When debt is employed due to the demand for cash, the CR level is low.

*E/FA*: The total shareholder equity to fixed assets ratio, which reflects the management's approach to financing assets. When  $E/FA = 1$ , an enterprise finances risky fixed assets with equity. When  $E/FA > 1$ , then financing is conservative, and when  $E/FA < 1$ , it is aggressive. It follows that aggressive asset financing increases the propensity of the management to incur debt.

*GDP%*: The GDP growth rate, reflecting the state of the economy. A high rate contributes to investment optimism, which in turn generates demand for capital (Ramli et al., 2019).

The correlation between the variables is presented in Table 4.

### 3.2.5. Model selection

In general, the pooled ordinary least square (OLS), fixed-effects (FE), and random-effects (RE) estimation methods are common techniques for the estimation of panel data. To determine which model is better, we perform an F-test for the FE model, the Breusch–Pagan Lagrange multiplier (LM) test for the RE model, and the Hausman test for both FE and RE models (Onali et al., 2017). As shown in Table 5, in all the

models, the probability in the F-test is 0.000, which means the rejection of H0, which assumes that the OLS panel model is most suitable, in favor of H1, which suggests that the FE model is more appropriate. A low probability value (all  $p = 0.000$ ) in the Breusch–Pagan LM test means rejection of H0 and confirmation of H1, that RE model is more appropriate than the OLS model. In turn, a low probability value (all  $p = 0.000$ ) for the Hausman test means rejection of H0, that the RE model is more effective, rather than H1, that the FE model is more effective. It follows that the FE model is the most effective for all the regressions. Then, to increase the efficiency of the model, we conduct tests of groupwise heteroskedasticity with the Wald test and autocorrelation with the Wooldridge test (Table 5). The results of the Wald test (all  $p = 0.000$ ) demonstrate that the models all have heteroskedasticity problems. Similarly, the Wooldridge test reveals the presence of autocorrelation in all the regressions. To address these issues, we adopt the FE model with adjusted standard errors (Le & Phan, 2017) (Table 6). The FE model enables researchers to control for unobserved heterogeneity and eliminate omitted-variable bias (Gormley & Matsa, 2014). The results obtained by Flannery and Hankins (2013) support our decision to use FE to study the relationship of the equity structure with indebtedness. They show that the FE estimator is accurate for long panels even when endogenous independent variables and second-order serial correlation exist.

## 4. Findings

### 4.1. The SC/E relationship with the indebtedness of enterprises

The tests in the previous section indicate that the most effective model for testing the relationship between the equity structure and the debt of an enterprise is the FE estimator with robust standard errors, the results of which are presented in Table 6. This table shows that, in general, for all the enterprises studied, SC/E is related to total debt (D/A). Whenever SC/E increases by 1 unit, on average D/A increases by 0.165 units, holding all other variables constant ( $p < 0.01$ ). This is the strongest relationship with D/A among all the explanatory variables included in the model. It highlights the importance of

share capital as a signal of owners' involvement in the enterprise and a determinant of good security for the loans granted. The division of the sample into enterprises in which the owners are not fully liable for the liabilities (LLG) and enterprises in which at least some of the owners are fully responsible for the liabilities (ULG) shows that only in the LLG have a relationship between SC/E and D/A, in which an increase in SC/E of 1 unit increases D/A by 0.185 units, holding all other variables constant ( $p < 0.01$ ). It is also the strongest relationship with D/A among all the explanatory variables (except the constant) in this group of enterprises. In contrast, for ULG the relationship between SC/E and D/A is statistically insignificant ( $p > 0.1$ ). Our more detailed analysis of the relationship between SC/E and individual types of debt indicates that both LLG and ULG have a relationship between SC/E and interest debt (IBD/E), that is, debt issued by adjusting creditors. However, it is clearly stronger at LLG (0.391;  $p < 0.01$ ) than ULG (0.137;  $0.01 < p < 0.05$ ). In the case of operational debt (STL/CA) extended by non-adjusting creditors, only LLG have a relationship between SC/E and STL/CA (0.408;  $p < 0.01$ ), whereas it is statistically insignificant ( $p > 0.1$ ) for ULG. Importantly, at LLG, SC/E has a stronger relationship with STL/CA than with IBD/E: 0.408 ( $p < 0.01$ ) versus 0.391 ( $p < 0.01$ ). This confirms that the capital maintenance regime plays a greater role for non-adjusting creditors, who cannot secure their claims with the help of covenants (Panetsos, 2016).

These results confirm that limited liability creates additional risk for lenders, which is the basis of the capital maintenance regime (Armour, 2000). Lenders expect signals about the degree of owner involvement in the company and the legal security of loans from LLG that prevent shareholders from taking over the value to the detriment of creditors (Ho, 2017), whereas they expect this from ULG to a much lesser extent, and non-adjusting creditors do not expect it at all. For these companies, the ability to realize their claims on the property of the owners is probably sufficient security for the lenders.

Our findings cast doubt on the views advanced by opponents of the capital maintenance regime, who have argued that it has ceased to fulfill its function of aligning the interests of creditors and shareholders effectively, by demonstrating that the opposite remains true. We document a persistently strong link between legal capital and the availability of external financing. Therefore, strict adherence to the capital maintenance regime remains an effective mechanism for mitigating credit risk. It is true that alternative mechanisms (covenants and creditor recourse) have been strengthened and can be regarded as at least a complementary tool for credit risk management. However, the empirical data suggest that creditors continue to place substantial economic value on capital maintenance.

#### 4.2. Control variables

The control variables have significant coefficients in most regressions for the total sample and the LLG subsample. For ULG, the coefficients are significant less frequently (Table 6). The economic conditions (GDP%) have the opposite relationship with interest debt (IBD/E), in accordance with the pecking

order theory; during an economic downturn, leverage should increase because funds from internal sources are insufficient. At the same time, operational debt (STL/CA) is not related to economic conditions. The size of enterprises is positively correlated with each type of debt, except STL/CA for ULG. This is consistent with prior papers (Al-Najjar & Hussainey, 2011; Deesomsak et al., 2004; Rajan & Zingales, 1995; Ramli et al., 2019) and with transaction cost theory, which indicates that large firms tend to be more diversified and have greater access to debt financing. Profitability (ROA) has a negative relationship with IBD/E for LLG (it is insignificant for ULG). This result is in line with the pecking order theory, in which profitable firms prefer internal sources of funds to debt financing (Booth et al., 2001; Rajan & Zingales, 1995). ROA has no significant relationship with STL/CA. S/A is negatively related to IBD/E for LLG (it is insignificant for ULG). This confirms the assumption that, with more capital-intensive production, an enterprise is more likely to use bank debt. S/A, however, is not related to operating debt (STL/CA). The cost of debt (COD) has a positive relationship with IBD/E and a negative relationship with STL/CA. This means that, when COD is higher, the willingness to use bank loans is lower, and the willingness to use operating debt is higher. E/FA is negatively related to all types of debt. This supports the theory that when funding is more aggressive, which reflects risk aversion, the debt burden is greater. CR has a negative relationship with debt. Businesses that do not invest may have excessively high cash balances. But developing businesses are hungry for cash, which means that they keep its amounts low and take on debt more often.

#### 4.3. Robustness tests

Endogeneity, which is defined as a correlation between the explanatory variables and the error term in a regression, is one of the most important and ubiquitous issues faced in research on empirical finance and accounting (Roberts et al., 2013). There are three main sources of endogeneity: omitted variables, measurement error, and reverse causality (Roberts et al., 2013). The literature suggests that instrumental variable (IV) estimators or dynamic panel generalized method of moments (GMM) be used to mitigate endogeneity (Le & Phan, 2017). However, the problem that arises with IV estimators is the difficulty of finding variables that can serve as valid instruments, which are crucial for unbiased IV estimators. In contrast, a GMM dynamic panel is recommended for short panels (Lee et al., 2017) and dynamic economic processes (Wintoki et al., 2012). The first-difference GMM (FDGMM) results presented in Appendix Table A1 confirm the previous findings. However, the weakness of the models used is their inclusion of incorrect instruments (in all models, the  $p$ -value of the Sargan test is less than 0.01), which may be due to the presence of heteroskedasticity (Arellano & Bond, 1991).

Therefore, in this paper, the negative effects of individual sources of endogeneity are mitigated as follows. The problem of omitted variables is mitigated by the use of the FE estimation model (Gormley & Matsa, 2014; Roberts et al., 2013;

Table 5  
The relationship between equity structure and firm indebtedness: fixed-effects and random-effects regressions.

	D/A						IBD/E			
	Total		LLG		ULG		Total		LLG	
	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE
const	-0.497*** (0.023)	0.068*** (0.016)	-0.576*** (0.024)	0.049*** (0.016)	0.105 (0.075)	0.290*** (0.056)	-0.954*** (0.065)	0.217*** (0.038)	-1.053*** (0.068)	0.210*** (0.040)
GDP%	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001** (0.000)	0.002 (0.001)	0.002 (0.001)	-0.003*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)	-0.004*** (0.001)
LnA	0.089*** (0.002)	0.039*** (0.001)	0.095*** (0.002)	0.041*** (0.001)	0.039*** (0.007)	0.021*** (0.005)	0.148*** (0.006)	0.044*** (0.003)	0.155*** (0.006)	0.044*** (0.003)
ROA	-0.074*** (0.010)	-0.119*** (0.010)	-0.079*** (0.011)	-0.119*** (0.011)	-0.073** (0.034)	-0.132*** (0.033)	-0.128*** (0.028)	-0.212*** (0.027)	-0.127*** (0.030)	-0.205*** (0.029)
S/A	0.034*** (0.002)	0.045*** (0.001)	0.035*** (0.002)	0.047*** (0.001)	0.027*** (0.005)	0.033*** (0.004)	-0.025*** (0.004)	0.014*** (0.003)	-0.028*** (0.005)	0.013*** (0.004)
SC/E	0.165*** (0.004)	0.079*** (0.004)	0.185*** (0.005)	0.085*** (0.004)	0.037*** (0.012)	0.026** (0.011)	0.357*** (0.012)	0.127*** (0.009)	0.391*** (0.013)	0.132*** (0.010)
COD	-0.111*** (0.008)	-0.114*** (0.008)	-0.112*** (0.008)	-0.116*** (0.008)	-0.085*** (0.028)	-0.085*** (0.028)	-0.739*** (0.022)	-0.793*** (0.022)	-0.740*** (0.023)	-0.795*** (0.023)
E/FA	-0.045*** (0.001)	-0.042*** (0.001)	-0.045*** (0.001)	-0.043*** (0.001)	-0.037*** (0.004)	-0.034*** (0.003)	-0.122*** (0.003)	-0.115*** (0.003)	-0.121*** (0.003)	-0.115*** (0.003)
CR	-0.059*** (0.002)	-0.071*** (0.002)	-0.058*** (0.002)	-0.070*** (0.002)	-0.075*** (0.007)	-0.088*** (0.007)	-0.056*** (0.005)	-0.091*** (0.005)	-0.055*** (0.005)	-0.090*** (0.005)
Obs.	25,211	25,211	23,335	23,335	1876	1876	25,211	25,211	23,335	23,335
R <sup>2</sup> (LSDV)	0.843		0.845		0.837		0.741		0.741	
R <sup>2</sup> (within)	0.281		0.294		0.190		0.222		0.227	
Theta ( $\theta$ )			0.720		0.719		0.656		0.656	
$\hat{\sigma}_u^2$			0.020		0.020		0.100		0.100	
F-test (overall)	17.06		17.26		14.81		10.53		10.601	
p-value Breusch–Pagan test	0.000		34,748.57		32,028.89		2085.55		23,508.17	
p-value Hausman test	0.000		2292.41		2419.91		61.45		1524.15	
p-value Wald test for heteroskedasticity	1.32E+10		5.24E+07		2.38E+06		2.83E+07		3.02E+07	
p-value Wooldridge test	0.000		190.72		50.23		128.39		122.43	
p-value	0.000		0.000		0.000		0.000		0.000	

Notes: The table shows the debt results for the fixed-effects (FE) and random-effects (RE) models. The dependent variables are D/A, IBD/E, and STL/CA, as defined in Table 1. The independent variables are also defined in Table 1. The results were estimated for both the full sample and the two subsamples, LLG and ULG, characterized in Tables 2 and 3. The standard errors are reported in parentheses. \*, \*\*, and \*\*\* indicate that the coefficients are significant at the 10%, 5%, and 1% levels, respectively.

Wintoki et al., 2012). Measurement errors should not have a large impact on endogeneity, as dependent and independent variables are both calculated on the basis of raw accounting data that directly measure the equity structure and the debt of enterprises, in accordance with the recommendations of Roberts et al. (2013). In addition, this research is conducted on the basis of the financial statements of one country (Poland), which ensures the consistency of accounting data; according to Nobes and Stadler (2018), this reduces the risk of errors specific to international research. Reverse causality also should not have a large impact on endogeneity.

Earlier studies (Dudycz & Brycz, 2021) show that the independent variable (SC/E) is a relatively constant characteristic

of enterprises; to a small extent, it is dependent on companies' performance and their ability to accumulate profit. To mitigate concern about reverse-causality endogeneity further, we perform an FE regression with lagged regressors. Lenders' decisions to extend a loan are made on the basis of historical performance, which demonstrates creditworthiness, so the effects of the capital maintenance regime can take a few years to be manifested. However, new loans have no impact on historical performance, so there is no fear of reverse causality. As before, the Wald and Wooldridge tests reveal the presence of heteroskedasticity and autocorrelation in almost all the regressions, so, to increase the efficiency of the model, we use the FE estimator with one- and two-year lagged variables and

IBD/E		STL/CA					
ULG		Total		LLG		ULG	
FE	RE	FE	RE	FE	RE	FE	RE
-0.311	0.244*	-3.706***	0.100	-4.215***	0.060	0.791**	1.090***
(0.216)	(0.141)	(0.266)	(0.115)	(0.290)	(0.123)	(0.324)	(0.200)
-0.004	-0.005	-0.001	-0.003	-0.001	-0.004	0.006	0.008
(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)
0.103***	0.052***	0.432***	0.100***	0.478***	0.106***	-0.009	-0.033*
(0.020)	(0.013)	(0.023)	(0.010)	(0.025)	(0.010)	(0.029)	(0.018)
-0.207**	-0.335***	0.125	-0.135	0.072	-0.188*	0.396***	0.294**
(0.099)	(0.091)	(0.116)	(0.104)	(0.126)	(0.113)	(0.148)	(0.133)
0.001	0.015	-0.020	-0.105***	-0.019	-0.115***	-0.037*	-0.027*
(0.014)	(0.010)	(0.018)	(0.011)	(0.019)	(0.012)	(0.021)	(0.014)
0.137***	0.076**	0.351***	0.275***	0.408***	0.288***	0.094*	0.090**
(0.036)	(0.030)	(0.050)	(0.030)	(0.056)	(0.032)	(0.054)	(0.043)
-0.718***	-0.739***	0.646***	0.415***	0.670***	0.417***	0.397***	0.400***
(0.082)	(0.080)	(0.092)	(0.086)	(0.098)	(0.093)	(0.122)	(0.118)
-0.121***	-0.114***	-0.088***	-0.137***	-0.086***	-0.138***	-0.056***	-0.085***
(0.010)	(0.009)	(0.012)	(0.010)	(0.013)	(0.011)	(0.015)	(0.013)
-0.067***	-0.103***	-0.487***	-0.364***	-0.499***	-0.372***	-0.272***	-0.254***
(0.022)	(0.020)	(0.021)	(0.018)	(0.022)	(0.019)	(0.032)	(0.029)
1876	1876	25,211	25,211	23,335	23,335	1876	1876
0.739		0.622		0.623		0.614	
0.186		0.056		0.058		0.068	
	0.653		0.487		0.485		0.624
	0.102		0.584		0.614		0.188
9.51		7.13		7.13		5.95	
0.000		0.000		0.000		0.000	
	1564.94		32393.26		29,956.29		517.99
	0.000		0.000		0.000		0.000
	45.91		437.65		436.63		21.92
	0.000		0.000		0.000		0.005
1.13E+05		1E+09		1.84E+09		5.29E+06	
0.000		0.000		0.000		0.000	
39.86		13.72		13.53		10.32	
0.000		0.000		0.000		0.000	

robust standard errors (Appendix Tables A2 and A3). The results obtained confirm the findings in Table 6. The direction of the key experimental relationships remains unchanged. We documented no substantial shifts in the statistical significance of the regression coefficients for the explanatory variables. Thus, changing the model specification and altering the structure of the lags yielded qualitatively equivalent empirical results.

Finally, we examine the time effects because events that could affect the functioning of the capital maintenance principle occurred during the sample period covered by the panel data set, 2005–2018, such as the financial crisis in 2008 as well as the change in legal regulation regarding the allowance not to

provide financial statements in 2009. We conducted two types of analyses. In the first type of analysis, we introduce time dummies (Appendix Table A4) and see that, for LLG each year, the impact on the interest debt (IBD/E) comes from year-specific FE that are not controlled by other explanatory variables. However, the scale of their shocks in the intercept is small. However, ULG have almost no annual shocks to this debt. In the case of operating debt (STL/CA), the FE for the year appear sporadically, which proves the stability of the factors that determine this debt. In order to examine whether the results were affected by the increase in CE/E from the reduction in the denominator (E) due to the loss achieved, we perform analyses on a sample of observations, excluding those

Table 6  
The effect of the equity structure on firm indebtedness: The fixed-effects estimator with robust standard errors.

	D/A					IBD/E					STL/CA				
	Total	LLG	ULG			Total	LLG	ULG			Total	LLG	ULG		
const	-0.497*** (0.061)	-0.308*** (0.060)	-0.576*** (0.065)	-0.387*** (0.064)	0.105 (0.156)	0.276* (0.152)	-0.954*** (0.140)	-1.296*** (0.146)	-1.053*** (0.148)	-1.434*** (0.154)	-0.311 (0.413)	-0.296 (0.424)	-3.706*** (0.892)	-4.215*** (0.979)	0.791* (0.417)
GDP	0.001*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002 (0.001)	0.002* (0.001)	-0.003** (0.001)	-0.002** (0.001)	-0.003** (0.001)	-0.002* (0.001)	-0.004 (0.004)	-0.003 (0.004)	-0.001 (0.004)	-0.001 (0.004)	0.006 (0.004)
LnA	0.089*** (0.005)	0.076*** (0.005)	0.095*** (0.006)	0.082*** (0.006)	0.039*** (0.014)	0.028* (0.014)	0.148*** (0.012)	0.166*** (0.013)	0.155*** (0.013)	0.177*** (0.014)	0.103*** (0.038)	0.089** (0.039)	0.432*** (0.081)	0.478*** (0.089)	-0.009 (0.036)
ROA	-0.074*** (0.015)	-0.012 (0.015)	-0.079*** (0.015)	-0.017 (0.015)	-0.073 (0.056)	-0.020 (0.054)	-0.128*** (0.038)	-0.261*** (0.039)	-0.127*** (0.039)	-0.258*** (0.041)	-0.207 (0.126)	-0.373*** (0.129)	0.125 (0.094)	0.072 (0.099)	0.396 (0.249)
S/A	0.034*** (0.003)		0.035*** (0.003)		0.027*** (0.008)		-0.025*** (0.008)	-0.045*** (0.009)	-0.028*** (0.009)	-0.049*** (0.009)	0.001 (0.023)	-0.016 (0.024)	-0.020 (0.027)	-0.019 (0.030)	-0.037 (0.028)
SC/E	0.165*** (0.010)	0.166*** (0.010)	0.185*** (0.011)	0.187*** (0.011)	0.037 (0.023)	0.037 (0.022)	0.357*** (0.028)	0.417*** (0.030)	0.391*** (0.030)	0.459*** (0.032)	0.137** (0.069)	0.143* (0.078)	0.351*** (0.059)	0.408*** (0.067)	0.094 (0.074)
COD	-0.111*** (0.010)	-0.096*** (0.010)	-0.112*** (0.010)	-0.097*** (0.010)	-0.085** (0.037)	-0.074** (0.037)	-0.739*** (0.027)	-0.761*** (0.027)	-0.740*** (0.028)	-0.762*** (0.029)	-0.718*** (0.087)	-0.727*** (0.092)	0.646*** (0.112)	0.670*** (0.122)	0.397*** (0.076)
E/FA	-0.045*** (0.002)	-0.043*** (0.002)	-0.045*** (0.002)	-0.043*** (0.002)	-0.037*** (0.007)	-0.034*** (0.007)	-0.122*** (0.006)		-0.121*** (0.006)		-0.121*** (0.017)		-0.088*** (0.010)	-0.086*** (0.011)	-0.056*** (0.012)
CR	-0.059*** (0.003)	-0.064*** (0.003)	-0.058*** (0.003)	-0.062*** (0.003)	-0.075*** (0.012)	-0.081*** (0.012)	-0.056*** (0.006)	-0.097*** (0.006)	-0.055*** (0.006)	-0.095*** (0.007)	-0.067*** (0.024)	-0.111*** (0.024)	-0.487*** (0.055)	-0.499*** (0.057)	-0.272** (0.113)
Obs.	25,211	25,211	23,335	23,335	1876	1876	25,211	25,211	23,335	23,335	1876	1876	25,211	23,335	1876
R <sup>2</sup> (LSDV)	0.843	0.839	0.845	0.841	0.837	0.833	0.741	0.721	0.741	0.722	0.739	0.715	0.622	0.623	0.614
R <sup>2</sup> (within)	0.281	0.264	0.294	0.277	0.190	0.173	0.222	0.162	0.227	0.170	0.186	0.112	0.056	0.058	0.068
F-test (overall)	3104.28	268.72	9677.12	314.75	149.95	74.64	514.33	60.87	92.61	59.74	289.90	81.06	7.13	7.13	5.95
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	711.51	737.017	707.81	739.11	39.86	74.64	549.58	495.02	545.14	499.79	31.36	31.26	111.69	96.24	25.34
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001

Notes: The table shows the debt results obtained for the fixed-effects estimator with robust standard errors. The dependent variables are D/A, IBD/E, and STL/CA, as defined in Table 1. The independent variables are also defined in Table 1. The results were estimated for the full sample and the two subsamples, LLG and ULG, characterized in Tables 2 and 3. The standard errors that are robust to heteroskedasticity are reported in parentheses. \*, \*\*, and \*\*\* indicate that coefficients are significant at the 10%, 5%, and 1% levels, respectively.

in which enterprises suffered losses (Appendix Table A5). The direction of the key experimental relationships remains unchanged in most models. One minor exception is a noticeable decrease in the relationship between CE/E and STL/CA. This might suggest that, in the case of operational debt, the role of share capital as an indicator of creditworthiness is particularly important in the event of losses.

In the second type of analysis, the panels were divided into subpanels for 2005–2008 and 2009–2018. Then, we perform regression analyses with these subpanels, using the Chow test (Chow, 1960) to analyze the same variables obtained in two different data sets to determine whether they were similar enough to be pooled (Appendix Table A6). In all the models, the Chow test ( $p = 0$ ) shows that the data contain a structural breakpoint in 2008–2009. However, the general patterns in both subpanels are consistent with those in Table 6. The direction of the key experimental relationships remains unchanged. However, the subpanel 2009–2018 in Appendix Table A6 shows an increase in the impact of SC/E on all types of debt (D/A, IBD/E, STL/CA) for LLG. This means that, after the crisis in 2008, the role of the capital maintenance regime in obtaining debt financing for LLG increased.

## 5. Discussion

In Europe, the strong position of the capital maintenance regime results from the position represented, among others, by Germany, where this concept has many supporters and where the company law model was a model for the European legal regulations (Gelter & Reif, 2017). For many years, supporters and opponents have made many correct arguments in the normative discourse (Hopt, 2010), and the legislation in both civil and common law jurisdictions agrees that regulations are necessary for maintaining adequate equity capital to cover lenders' claims (Handschin, 2012). However, proponents of the rule appear to deprecate the solutions proposed by its opponents less than the opponents of the proponents' solution. Whereas the opponents criticize the rule based on the primitive nature of legal capital, the supporters view the solutions proposed by the opponents as irrelevant (Bratton, 2006). The supporters do not propose using legal capital as the sole protection of lenders but, rather, as a “collective covenant” (Armour, 2006) that is particularly important for trade creditors, for whom complex financial negotiations have no cost benefits, and involuntary creditors, who have no opportunities for engaging in contracts (Bratton, 2006). Our study confirms the correctness of these views.

At the same time, nothing in the legal capital regime prevents voluntary creditors from negotiating tighter protection. However, the empirical research conducted so far does not support the attitude of those who oppose legal capital, despite its wide acceptance. By completely rejecting the legal capital regime, the opponents have shown complete confidence in their solutions, which assume unlimited freedom in negotiating security or the effectiveness of the liquidity or solvency test. According to Handschin (2012), only in a

perfectly functioning market, in which all the participants are well informed and have full freedom to adapt, can covenants fully replace the legal rules of capital maintenance. In contrast, liquidity or solvency tests are prepared on the basis of financial forecasts and, therefore, are subject to a high degree of subjectivity and susceptibility to manipulation. The supporters of solvency tests have considerable confidence in the qualifications and incentives held by the management board as well as in the institutional support in common law countries, resulting in the creation of reliable information, but this has not been confirmed by empirical studies. The presentation of high-quality and reliable information is not of particular concern to managers, even in common law countries (Bowen & Khan, 2014; Dudycz & Prażników, 2020).

## 6. Conclusions

The goal of this paper is to investigate the relationship between legal capital adequacy, measured as the proportion of share capital in total equity, and firm leverage. Our research shows that the capital maintenance regime implemented through share capital affects lenders' perception of credit risk and thus enterprises' ability to raise debt. After the 2008 financial crisis, its impact even increased.

In line with the predictions previously presented in the literature, formulated on the basis of the normative debate, although legal capital is important for all creditors, it is more important for non-adjusting creditors, who cannot secure liabilities with agreements, than for adjusting creditors. For non-adjusting creditors, legal capital is more important, especially when companies incur losses. Our research also shows that the capital maintenance regime is of particular importance for lenders to companies in which the owners have limited liability. It is much less important for enterprises in which at least some of the owners have unlimited liability. There are two possible reasons. First, for this group of companies, the rules of capital maintenance are less stringent, and the portion of share capital in equity expresses only the degree of involvement of the owners in the company. They have greater freedom to redistribute equity capital than a limited liability company has. Second, the ability to enforce claims on all of the owners' assets reduces the risk to the lender.

Our research was carried out on a sample of enterprises from one country. This approach has both advantages and disadvantages. Conducting research in one country enables the examination of enterprises in the same legal and institutional environment, creating information according to the same accounting standards, which contributes to the comparability of the results. However, the findings might not be confirmed in countries with different legal and institutional systems and economic practices. Therefore, further research should seek to confirm the results in other countries. It should also seek to determine the extent to which information about the amount of legal capital is integrated into loan procedures and influences the decisions by lenders.

Much of the criticism of the capital maintenance regime focuses on the usefulness of minimum capital requirements. It

has been emphasized that, because of substantial fluctuation in the value of assets, they have practically no value as security for receivables. Critics have also suggested that the minimum requirements erect a barrier for small entrepreneurs and trigger their migration to countries with lower requirements (Armour et al., 2017). In turn, supporters emphasize that the benefit of the minimum requirements is that they prevent abuse of the privilege of limited liability (Ewang, 2007), and, therefore, the state should permit the creation of firms only if they have sufficient financial resources for success (Machado, 2009).

Further research should also confirm whether the reduction or elimination of minimum capital requirements actually favors the creation of fraudulent companies. The Polish experience shows that, after a series of fraudulent activities by limited liability companies with a very short history, the word “company” had a pejorative meaning for many years. It seems unrealistic to expect the minimum requirements to act as a barrier for entrepreneurs and encourage them to open their businesses where these restrictions are less severe. One-time charges for minimum requirements are irrelevant compared to the burden of taxes or the cost of doing business in another

country. Our research also shows that the amount of share capital in the enterprises surveyed is many times higher than the minimum required.

**Declarations**

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- The authors have no relevant financial or non-financial interests to disclose.
- The authors have no competing interests to declare that are relevant to the content of this article.
- All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.
- The authors have no financial or proprietary interests in any material discussed in this article.

**Appendixes.**

Appendix Table A1

The relationship between equity structure and firm indebtedness: FDGMM estimator.

	D/A			IBD/E			STL/CA		
	Total	LLG	ULG	Total	LLG	ULG	Total	LLG	ULG
Dependent variable(-1)	1.142*** (0.055)	1.179*** (0.059)	0.350*** (0.108)	0.721*** (0.029)	0.737*** (0.030)	0.427*** (0.078)	0.069 (0.092)	0.070 (0.092)	-0.283 (0.405)
GDP	0.003*** (0.001)	0.003*** (0.001)	0.002* (0.001)	0.002 (0.001)	0.003* (0.001)	-0.002 (0.005)	0.001 (0.009)	0.001 (0.009)	0.001 (0.010)
LnA	0.109*** (0.007)	0.113*** (0.008)	0.073*** (0.011)	0.214*** (0.017)	0.219*** (0.019)	0.162*** (0.038)	0.443*** (0.096)	0.507*** (0.107)	-0.095 (0.129)
ROA	-0.362*** (0.027)	-0.372*** (0.028)	-0.203*** (0.058)	-0.528*** (0.056)	-0.517*** (0.059)	-0.579*** (0.152)	-0.137 (0.104)	-0.189* (0.108)	0.350 (0.467)
S/A	-0.032*** (0.005)	-0.034*** (0.005)	-0.006 (0.008)	-0.055*** (0.010)	-0.060*** (0.011)	-0.012 (0.023)	-0.012 (0.020)	0.001 (0.021)	-0.101 (0.074)
SC/E	0.109*** (0.017)	0.118*** (0.019)	0.053*** (0.019)	0.308*** (0.039)	0.322*** (0.045)	0.226*** (0.058)	0.480*** (0.114)	0.550*** (0.139)	0.020 (0.070)
COD	-0.105*** (0.014)	-0.104*** (0.015)	-0.106*** (0.036)	-0.629*** (0.041)	-0.628*** (0.043)	-0.631*** (0.101)	0.520*** (0.087)	0.540*** (0.093)	0.255*** (0.095)
E/FA	-0.002 (0.003)	0.000 (0.004)	-0.026*** (0.009)	-0.048*** (0.008)	-0.046*** (0.008)	-0.062** (0.025)	-0.064*** (0.017)	-0.063*** (0.018)	-0.051*** (0.019)
CR	-0.031*** (0.004)	-0.031*** (0.004)	-0.036*** (0.013)	-0.015* (0.008)	-0.017** (0.008)	0.012 (0.024)	-0.424*** (0.062)	-0.433*** (0.065)	-0.374 (0.236)
Obs.	13,413	12,444	969	13,413	12,444	969	13,410	12,441	969
Instruments	86	86	86	86	86	86	86	86	86
AR(1) test	-14.42	-13.66	-3.78	-15.12	-14.58	-4.05	-1.19	-1.18	0.43
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.234	0.240	0.667
AR(2) test	1.75	1.37	1.76	0.38	0.31	-0.00	-1.34	-1.28	-1.63
p-value	0.080	0.170	0.079	0.703	0.759	0.999	0.181	0.200	0.102
Sargan test	307.87	276.59	115.36	412.45	395.00	111.83	2132.00	2021.45	352.40
p-value	0.000	0.000	0.003	0.000	0.000	0.006	0.000	0.000	0.000
Wald test	1553.04	1482.40	124.57	1939.90	1876.45	135.35	164.82	148.46	44.07
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: The table shows the debt results for the FDGMM estimator. The dependent variables are D/A, IBD/E, and STL/CA, as defined in Table 1. The independent variables are also defined in Table 1. The results were estimated for the full sample and two subsamples, LLG and ULG, characterized in Tables 2 and 3. The standard errors are reported in parentheses. \*, \*\*, and \*\*\* indicate that coefficients are significant at the 10%, 5%, and 1% levels, respectively.

Appendix Table A2

The relationship between equity structure and firm indebtedness: The fixed-effects estimator with robust standard errors and one-year lagged variables.

	D/A			IBD/E			STL/CA		
	Total	LLG	ULG	Total	LLG	ULG	Total	LLG	ULG
const	-0.159** (0.075)	-0.214*** (0.079)	0.419** (0.206)	-0.737*** (0.168)	-0.772*** (0.176)	-0.453 (0.619)	-4.916*** (1.348)	-5.441*** (1.451)	1.470** (0.619)
GDP-1	0.002*** (0.001)	0.002*** (0.001)	0.000 (0.002)	0.004*** (0.001)	0.005*** (0.002)	-0.001 (0.005)	-0.006 (0.005)	-0.007 (0.005)	0.000 (0.009)
LnA-1	0.056*** (0.007)	0.060*** (0.007)	0.008 (0.019)	0.113*** (0.015)	0.115*** (0.015)	0.101* (0.058)	0.537*** (0.121)	0.583*** (0.130)	-0.073 (0.054)
ROA-1	-0.082*** (0.019)	-0.086*** (0.019)	-0.072 (0.079)	-0.108** (0.048)	-0.091* (0.050)	-0.288** (0.141)	0.126 (0.101)	0.071 (0.105)	0.446 (0.333)
S/A-1	0.026*** (0.004)	0.027*** (0.004)	0.020** (0.008)	-0.005 (0.010)	-0.007 (0.011)	0.013 (0.025)	0.007 (0.047)	0.009 (0.052)	-0.053 (0.032)
SC/E-1	0.119*** (0.012)	0.132*** (0.013)	0.010 (0.029)	0.226*** (0.036)	0.245*** (0.039)	0.027 (0.084)	0.360*** (0.088)	0.416*** (0.099)	0.025 (0.066)
COD-1	-0.089*** (0.012)	-0.086*** (0.013)	-0.123*** (0.041)	-0.341*** (0.033)	-0.325*** (0.035)	-0.537*** (0.110)	0.142 (0.102)	0.161 (0.111)	-0.003 (0.096)
E/FA-1	-0.029*** (0.003)	-0.030*** (0.003)	-0.017* (0.009)	-0.063*** (0.007)	-0.065*** (0.007)	-0.036 (0.023)	-0.056*** (0.016)	-0.053*** (0.018)	-0.015 (0.015)
CR-1	-0.029*** (0.004)	-0.029*** (0.004)	-0.014 (0.017)	-0.038*** (0.007)	-0.041*** (0.007)	0.030 (0.035)	-0.334*** (0.069)	-0.339*** (0.072)	-0.226* (0.130)
Obs.	16,827	15,603	1224	16,827	15,602	1224	16,827	15,603	1224
R <sup>2</sup> (LSDV)	0.840	0.840	0.843	0.736	0.736	0.737	0.667	0.668	0.570
R <sup>2</sup> (within)	0.113	0.122	0.041	0.071	0.074	0.056	0.041	0.043	0.032
Robust F-test (overall)	351.64	166.47	92.82	71.69	113.00	19.33	1546.59	200.90	14.75
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	510.81	479.87	69.30	358.89	322.44	51.73	132.75	117.89	35.06
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: The table shows the debt results for the fixed-effects estimator with robust standard errors using independent variables lagged 1 year with respect to the dependent variables. The dependent variables are D/A, IBD/E, and STL/CA, as defined in Table 1. The independent variables are also defined in Table 1. The results were estimated for the full sample and two subsamples, LLG and ULG, characterized in Tables 2 and 3. The standard errors that are robust to heteroskedasticity are reported in parentheses. \*, \*\*, and \*\*\* indicate that coefficients are significant at the 10%, 5%, and 1% levels, respectively.

Appendix Table A3

The relationship between equity structure and firm indebtedness: The fixed-effects estimator with two-year lagged variables and robust standard errors.

	D/A			IBD/E			STL/CA		
	Total	LLG	ULG	Total	LLG	ULG	Total	LLG	ULG
const	0.202** (0.081)	0.188** (0.085)	0.456* (0.243)	-0.257 (0.175)	-0.222 (0.182)	-0.512 (0.663)	-3.787** (1.541)	-4.158** (1.649)	1.186* (0.608)
GDP-2	0.000 (0.001)	0.000 (0.001)	-0.001 (0.002)	0.003 (0.002)	0.004** (0.002)	-0.009 (0.007)	-0.014*** (0.005)	-0.016*** (0.006)	-0.001 (0.009)
LnA-2	0.023*** (0.007)	0.024*** (0.007)	0.000 (0.022)	0.063*** (0.015)	0.059*** (0.016)	0.091 (0.061)	0.429*** (0.138)	0.463*** (0.147)	-0.059 (0.055)
ROA-2	-0.071*** (0.020)	-0.068*** (0.021)	-0.118 (0.081)	-0.096* (0.052)	-0.069 (0.054)	-0.326* (0.195)	0.074 (0.118)	0.023 (0.125)	0.400 (0.355)
S/A-2	0.019*** (0.004)	0.018*** (0.004)	0.026*** (0.009)	0.011 (0.011)	0.007 (0.012)	0.050 (0.030)	0.032 (0.048)	0.033 (0.053)	-0.025 (0.025)
SC/E-2	0.066*** (0.013)	0.068*** (0.013)	0.046 (0.043)	0.128*** (0.038)	0.126*** (0.040)	0.108 (0.126)	0.216** (0.098)	0.242** (0.107)	0.115 (0.099)
COD-2	-0.040*** (0.014)	-0.041*** (0.014)	-0.010 (0.050)	-0.140*** (0.037)	-0.136*** (0.038)	-0.168 (0.152)	-0.047 (0.084)	-0.034 (0.092)	-0.065 (0.112)
E/FA-2	-0.015*** (0.003)	-0.016*** (0.003)	-0.002 (0.010)	-0.019*** (0.007)	-0.022*** (0.007)	0.010 (0.029)	-0.032* (0.017)	-0.031* (0.018)	0.002 (0.016)
CR-2	-0.014*** (0.004)	-0.014*** (0.004)	-0.011 (0.015)	-0.025*** (0.009)	-0.028*** (0.009)	0.030 (0.041)	-0.104 (0.086)	-0.099 (0.090)	-0.190 (0.153)
Obs.	13,760	12,753	1007	13,760	12,753	1007	13,759	12,752	1007
R <sup>2</sup> (LSDV)	0.842	0.840	0.860	0.742	0.741	0.748	0.728	0.729	0.539

(continued on next page)

Appendix Table A3 (continued)

	D/A			IBD/E			STL/CA		
	Total	LLG	ULG	Total	LLG	ULG	Total	LLG	ULG
R <sup>2</sup> (within)	0.032	0.033	0.033	0.015	0.016	0.026	0.016	0.018	0.021
Robust F-test (overall)	494.45	147.18	47.85	494.45	299.24	15.36	1255.00	197.86	346.93
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	375.93	554.30	56.82	264.18	273.15	60.78	138.07	124.43	31.69
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: The table shows the debt results for the fixed-effects estimator with robust standard errors using independent variables lagged two years with respect to the dependent variables. The dependent variables are D/A, IBD/E, and STL/CA, as defined in Table 1. The independent variables are also defined in Table 1. The results were estimated for the full sample and two subsamples, LLG and ULG, characterized in Tables 2 and 3. The standard errors that are robust to heteroskedasticity are reported in parentheses. \*, \*\*, and \*\*\* indicate that coefficients are significant at the 10%, 5%, and 1% levels, respectively.

Appendix Table A4

The relationship between equity structure and firm indebtedness: The fixed-effects estimator with time dummies and robust standard errors.

	D/A			IBD/E			STL/CA		
	Total	LLG	ULG	Total	LLG	ULG	Total	LLG	ULG
const	-0.516*** (0.062)	-0.598*** (0.066)	0.140 (0.147)	-1.032*** (0.142)	-1.144*** (0.150)	-0.245 (0.405)	-3.460*** (0.867)	-3.950*** (0.950)	0.916* (0.471)
GDP	-0.030*** (0.003)	-0.030*** (0.003)	-0.026** (0.011)	-0.059*** (0.007)	-0.061*** (0.008)	-0.016 (0.029)	0.024 (0.031)	0.030 (0.033)	-0.045 (0.039)
LnA	0.104*** (0.006)	0.110*** (0.006)	0.049*** (0.014)	0.177*** (0.013)	0.186*** (0.014)	0.104** (0.041)	0.402 (0.080)	0.444*** (0.087)	0.002 (0.053)
ROA	-0.099*** (0.015)	-0.105*** (0.016)	-0.091 (0.062)	-0.191*** (0.038)	-0.193*** (0.040)	-0.228* (0.130)	0.217** (0.108)	0.171 (0.113)	0.394 (0.283)
S/A	0.033*** (0.003)	0.034*** (0.003)	0.025*** (0.008)	-0.028*** (0.008)	-0.031*** (0.009)	-0.002 (0.023)	-0.017 (0.027)	-0.015 (0.030)	-0.038 (0.027)
SC/E	0.161*** (0.010)	0.180*** (0.011)	0.038 (0.023)	0.351*** (0.027)	0.382*** (0.029)	0.136* (0.070)	0.355*** (0.059)	0.415*** (0.067)	0.095 (0.075)
COD	-0.123*** (0.010)	-0.124*** (0.011)	-0.097** (0.038)	-0.806*** (0.027)	-0.806*** (0.029)	-0.783*** (0.088)	0.770*** (0.124)	0.795*** (0.134)	0.475*** (0.090)
E/FA	-0.044*** (0.002)	-0.044*** (0.002)	-0.035*** (0.007)	-0.118*** (0.006)	-0.117*** (0.006)	-0.118*** (0.017)	-0.092*** (0.011)	-0.091*** (0.012)	-0.056*** (0.012)
CR	-0.056*** (0.003)	-0.055*** (0.003)	-0.074*** (0.011)	-0.048*** (0.006)	-0.047*** (0.006)	-0.064*** (0.024)	-0.495*** (0.055)	-0.509*** (0.058)	-0.273** (0.111)
dt_2	0.074*** (0.007)	0.075*** (0.007)	0.049* (0.025)	0.136*** (0.018)	0.145*** (0.018)	-0.018 (0.066)	-0.117 (0.074)	-0.136* (0.079)	0.099 (0.109)
dt_3	0.089*** (0.009)	0.089*** (0.009)	0.064* (0.033)	0.178*** (0.023)	0.187*** (0.023)	0.024 (0.087)	-0.131 (0.096)	-0.153 (0.102)	0.127 (0.134)
dt_4	0.010*** (0.003)	0.011*** (0.003)	-0.004 (0.011)	0.078*** (0.008)	0.079*** (0.008)	0.055* (0.033)	-0.181*** (0.034)	-0.188*** (0.036)	-0.090* (0.054)
dt_5	-0.046*** (0.005)	-0.045*** (0.005)	-0.054*** (0.019)	-0.047*** (0.013)	-0.047*** (0.014)	-0.036 (0.048)	-0.068 (0.049)	-0.066 (0.053)	-0.097* (0.054)
dt_6	-0.023*** (0.003)	-0.022*** (0.004)	-0.039*** (0.013)	-0.032*** (0.009)	-0.029*** (0.010)	-0.064* (0.034)	-0.044 (0.037)	-0.044 (0.040)	-0.072** (0.031)
dt_7	0.030*** (0.003)	0.031*** (0.003)	0.011 (0.013)	0.089*** (0.009)	0.094*** (0.009)	0.003 (0.036)	-0.097** (0.039)	-0.105** (0.042)	-0.008 (0.054)
dt_8	-0.082*** (0.009)	-0.080*** (0.009)	-0.090*** (0.033)	-0.119*** (0.023)	-0.123*** (0.024)	-0.042 (0.088)	0.019 (0.087)	0.034 (0.093)	-0.161 (0.104)
dt_9	-0.095*** (0.010)	-0.093*** (0.010)	-0.097*** (0.035)	-0.160*** (0.025)	-0.165*** (0.026)	-0.061 (0.091)	0.030 (0.092)	0.046 (0.099)	-0.161 (0.122)
dt_10	-0.045*** (0.005)	-0.043*** (0.005)	-0.061*** (0.017)	-0.063*** (0.013)	-0.064*** (0.013)	-0.034 (0.045)	-0.003 (0.044)	0.007 (0.047)	-0.131** (0.052)
dt_11	-0.034*** (0.004)	-0.033*** (0.004)	-0.052*** (0.013)	-0.048*** (0.010)	-0.050*** (0.010)	-0.027 (0.035)	0.042 (0.037)	0.049 (0.039)	-0.078 (0.060)
dt_12	-0.061*** (0.006)	-0.060*** (0.006)	-0.059*** (0.020)	-0.111*** (0.015)	-0.116*** (0.016)	-0.044 (0.054)	0.038 (0.051)	0.046 (0.054)	-0.066 (0.080)
dt_13	-0.001 (0.002)	0.000 (0.002)	-0.017** (0.007)	0.006 (0.006)	0.007*** (0.006)	-0.026 (0.023)	0.000 (0.025)	-0.004 (0.027)	0.030 (0.053)
Obs.	25,211	23,335	1876	25,211	23,335	1876	25,208	23,332	1876

(continued on next page)

Appendix Table A4 (continued)

	D/A			IBD/E			STL/CA		
	Total	LLG	ULG	Total	LLG	ULG	Total	LLG	ULG
R <sup>2</sup> (LSDV)	0.847	0.848	0.841	0.746	0.747	0.742	0.623	0.624	0.617
R <sup>2</sup> (within)	0.298	0.311	0.211	0.237	0.244	0.196	0.058	0.061	0.076
F-test (overall)	277.10	272.37	14.73	267.85	250.43	20.21	42.39	39.87	11.76
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Robust F-test (overall)	1095.88	103.19	25.09	56.87	157.09	36.46	2702.57	256.31	17.67
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Wald joint test on time dummies	215.29	201.11	26.54	262.85	253.27	23.34	46.17	42.80	43.77
p-value	0.000	0.000	0.009	0.000	0.000	0.025	0.000	0.000	0.000

Notes: The table shows the debt results for the fixed-effects estimator with time dummies and robust standard errors. The dependent variables are D/A, IBD/E, and STL/CA, as defined in Table 1. The independent variables are also defined in Table 1. The results were estimated for the full sample and two subsamples, LLG and ULG, characterized in Tables 2 and 3. The standard errors that are robust to heteroskedasticity are reported in parentheses. \*, \*\*, and \*\*\* indicate that coefficients are significant at the 10%, 5%, and 1% levels, respectively.

Appendix Table A5

The effect of the equity structure on firm indebtedness, excluding observations with losses: The fixed-effects estimator with robust standard errors.

	D/A			IBD/E			STL/CA		
	Total	LLG	ULG	Total	LLG	ULG	Total	LLG	ULG
const	-0.339*** (0.064)	-0.403*** (0.069)	0.102 (0.159)	-0.754*** (0.153)	-0.809*** (0.165)	-0.469 (0.404)	-2.579*** (0.764)	-3.024*** (0.852)	0.887* (0.455)
GDP	0.002*** (0.000)	0.002*** (0.000)	0.002* (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.004)	0.009** (0.004)	0.009* (0.005)	0.006 (0.005)
LnA	0.075*** (0.006)	0.081*** (0.006)	0.039*** (0.014)	0.131*** (0.013)	0.135*** (0.014)	0.115*** (0.037)	0.319*** (0.069)	0.359*** (0.076)	-0.018 (0.038)
ROA	-0.082*** (0.018)	-0.085*** (0.019)	-0.098* (0.055)	-0.149*** (0.046)	-0.147*** (0.049)	-0.213 (0.133)	0.180* (0.097)	0.136 (0.101)	0.397 (0.275)
S/A	0.030*** (0.003)	0.030*** (0.004)	0.029*** (0.009)	-0.036*** (0.009)	-0.042*** (0.009)	0.007 (0.024)	-0.023 (0.030)	-0.021 (0.033)	-0.037 (0.030)
SC/E	0.162*** (0.012)	0.182*** (0.013)	0.038 (0.030)	0.366*** (0.032)	0.397*** (0.035)	0.174** (0.082)	0.272*** (0.061)	0.317*** (0.069)	0.081 (0.104)
COD	-0.127*** (0.011)	-0.130*** (0.011)	-0.092** (0.040)	-0.764*** (0.029)	-0.766*** (0.030)	-0.740*** (0.091)	0.499*** (0.115)	0.511*** (0.126)	0.403*** (0.080)
E/FA	-0.042*** (0.002)	-0.042*** (0.002)	-0.036*** (0.007)	-0.115*** (0.006)	-0.114*** (0.006)	-0.118*** (0.017)	-0.071*** (0.008)	-0.070*** (0.009)	-0.050*** (0.012)
CR	-0.061*** (0.003)	-0.059*** (0.003)	-0.078*** (0.012)	-0.059*** (0.006)	-0.058*** (0.006)	-0.070*** (0.025)	-0.424*** (0.050)	-0.433*** (0.053)	-0.296** (0.125)
Obs.	21,438	19,695	1743	21,438	19,695	1743	21,436	19,693	1743
R <sup>2</sup> (LSDV)	0.849	0.851	0.834	0.750	0.751	0.741	0.685	0.686	0.621
R <sup>2</sup> (within)	0.264	0.275	0.201	0.219	0.224	0.193	0.050	0.052	0.074
F-test (overall)	1104.55	1634.87	513.21	202.25	113.78	222.61	973.88	1876.54	61.50
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	589.26	574.27	42.18	467.48	455.61	32.78	114.47	98.27	22.54
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004

Note: The table shows the debt results obtained for the fixed-effects estimator with robust standard errors. Observations in which enterprises made a loss were excluded from the sample. The dependent variables are D/A, IBD/E, and STL/CA, as defined in Table 1. The independent variables are defined in Table 1. The results were estimated for the full sample and the two subsamples, LLG and ULG, characterized in Tables 2 and 3. The standard errors that are robust to heteroskedasticity are reported in parentheses. \*, \*\*, and \*\*\* indicate that coefficients are significant at the 10%, 5%, and 1% levels, respectively.

Appendix Table A6

The relationship between equity structure and firm indebtedness in two subpanels (2005–2008 and 2009–2018): The fixed-effects estimator with robust standard errors.

	D/A						IBD/E			
	Total		LLG		ULG		Total		LLG	
	2005–2008	2009–2018	2005–2008	2009–2018	2005–2008	2009–2018	2005–2008	2009–2018	2005–2008	2009–2018
const	−0.584*** (0.124)	−0.768*** (0.079)	−0.632*** (0.133)	−0.869*** (0.083)	−0.110 (0.252)	−0.093 (0.171)	−1.855*** (0.318)	−1.563*** (0.203)	−1.786*** (0.336)	−1.722*** (0.215)
GDP	−0.004*** (0.001)	−0.003*** (0.001)	−0.003*** (0.001)	−0.003*** (0.001)	−0.006*** (0.002)	0.001 (0.002)	−0.014*** (0.002)	−0.011*** (0.001)	−0.013*** (0.002)	−0.012*** (0.002)
LnA	0.104*** (0.011)	0.115*** (0.007)	0.107*** (0.012)	0.123*** (0.007)	0.069*** (0.024)	0.057*** (0.015)	0.243*** (0.029)	0.204*** (0.018)	0.235*** (0.030)	0.217*** (0.019)
ROA	−0.168*** (0.023)	−0.121*** (0.020)	−0.166*** (0.024)	−0.135*** (0.020)	−0.224*** (0.072)	−0.024 (0.075)	−0.343*** (0.063)	−0.205*** (0.051)	−0.329*** (0.064)	−0.218*** (0.054)
S/A	0.013** (0.006)	0.025*** (0.004)	0.014** (0.007)	0.025*** (0.004)	0.009 (0.011)	0.018** (0.009)	−0.053*** (0.015)	−0.033*** (0.011)	−0.061*** (0.015)	−0.033*** (0.012)
SC/E	0.158*** (0.020)	0.182*** (0.013)	0.172*** (0.022)	0.202*** (0.014)	0.056* (0.032)	0.077*** (0.024)	0.389*** (0.059)	0.392*** (0.038)	0.403*** (0.066)	0.422*** (0.042)
COD	−0.135*** (0.014)	−0.083*** (0.012)	−0.131*** (0.015)	−0.082*** (0.013)	−0.171*** (0.043)	−0.080* (0.042)	−0.704*** (0.046)	−0.668*** (0.035)	−0.711*** (0.049)	−0.654*** (0.036)
E/FA	−0.036*** (0.003)	−0.042*** (0.003)	−0.037*** (0.004)	−0.042*** (0.003)	−0.023** (0.009)	−0.032*** (0.010)	−0.112*** (0.010)	−0.112*** (0.008)	−0.111*** (0.011)	−0.111*** (0.008)
CR	−0.044*** (0.004)	−0.051*** (0.003)	−0.043*** (0.004)	−0.049*** (0.003)	−0.060*** (0.016)	−0.070*** (0.016)	−0.026** (0.011)	−0.045*** (0.007)	−0.026** (0.011)	−0.043*** (0.007)
Obs.	8308	16,903	7698	15,637	610	1266	8308	16,903	7698	15,637
R <sup>2</sup> (LSDV)	0.947	0.886	0.947	0.887	0.951	0.877	0.886	0.797	0.886	0.797
R <sup>2</sup> (within)	0.292	0.308	0.297	0.324	0.282	0.194	0.260	0.232	0.261	0.236
Robust	6127.56	1813.78	12,920.25	331.95	64.47	76.92	2,498.39	1096.64	144.98	123.10
F-test (overall)										
p-value	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	399.33	592.79	372.17	104.85	38.09	45.25	341.00	419.24	318.15	405.78
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Chow test for structural change	1916.38		1785.41		134.46		1388.86		1287.31	
p-value	0.000		0.000		0.000		0.000		0.000	

Notes: The table shows the Chow test for structural change in two subpanels (2005–2008 and 2009–2018). The dependent variables are D/A, IBD/E, and STL/CA, as defined in Table 1. The independent variables are also defined in Table 1. The full sample and two subsamples, LLG and ULG, characterized in Tables 2 and 3, are divided into subpanels for the periods 2005–2008 and 2009–2018. The standard errors that are robust to heteroskedasticity are reported in parentheses. \*, \*\*, and \*\*\* indicate that coefficients are significant at the 10%, 5%, and 1% levels, respectively.

IBD/E		STL/CA					
ULG		Total		LLG		ULG	
2005–2008	2009–2018	2005–2008	2009–2018	2005–2008	2009–2018	2005–2008	2009–2018
–3.274***	–0.478	–0.288	–3.260***	–0.580	–3.797***	5.025***	0.746
(1.026)	(0.502)	(0.776)	(0.956)	(0.807)	(1.062)	(1.849)	(0.757)
–0.021***	–0.001	0.001	0.007	0.000	0.007	0.026**	–0.002
(0.007)	(0.005)	(0.005)	(0.008)	(0.005)	(0.008)	(0.012)	(0.007)
0.392***	0.119**	0.105	0.397***	0.133*	0.446***	–0.433**	0.002
(0.098)	(0.047)	(0.067)	(0.086)	(0.070)	(0.095)	(0.175)	(0.070)
–0.544**	–0.136	–0.175	–0.036	–0.248	–0.105	0.850	0.403
(0.277)	(0.163)	(0.177)	(0.104)	(0.177)	(0.109)	(0.780)	(0.292)
0.043	–0.031	–0.040	–0.071	–0.032	–0.073	–0.154	–0.068*
(0.046)	(0.025)	(0.038)	(0.043)	(0.040)	(0.048)	(0.093)	(0.040)
0.261**	0.236***	0.260***	0.299***	0.245***	0.366***	0.502	0.028
(0.111)	(0.086)	(0.090)	(0.083)	(0.075)	(0.098)	(0.479)	(0.053)
–0.630***	–0.834***	0.343***	0.867***	0.352***	0.902***	0.289**	0.526***
(0.132)	(0.124)	(0.105)	(0.167)	(0.114)	(0.180)	(0.120)	(0.111)
–0.116***	–0.105***	–0.044***	–0.076***	–0.044***	–0.076***	–0.034	–0.033**
(0.026)	(0.023)	(0.010)	(0.013)	(0.011)	(0.014)	(0.030)	(0.016)
–0.014	–0.064*	–0.313***	–0.488***	–0.321***	–0.495***	–0.181***	–0.324**
(0.039)	(0.033)	(0.036)	(0.056)	(0.037)	(0.058)	(0.041)	(0.144)
610	1266	8306	16,902	7696	15,636	610	1266
0.889	0.794	0.735	0.745	0.732	0.746	0.853	0.614
0.285	0.210	0.0357	0.049	0.037	0.051	0.147	0.073
47.29	36.73	560.70	1321.54	405.49	2105.80	1160.83	1160.83
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
43.22	59.34	117.99	88.79	104.85	76.67	14.35	27.76
0.000	0.000	0.000	0.000	0.000	0.000	0.073	0.000
101.16		1333.12		1238.78		54.86	
0.000		0.000		0.000		0.000	

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