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Does firm culture influence corporate financing decisions? Evidence from debt maturity choice☆

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ABSTRACT

This study establishes a relation between corporate culture and debt maturity choice. Specifically, superior corporate culture is associated with the choice of shorter-term debt, supporting the notion that superior culture reduces managerial agency problems resulting in managers being more receptive to external monitoring through the choice of shorter-term debt. The culture subcomponents of integrity, teamwork, and innovation are found to have a meaningful influence on the debt maturity structure choice. The relation between culture and debt maturity is more pronounced in firms with higher managerial stock ownership and those that are financially constrained, but is weakened in firms with a greater CEO sensitivity to stock prices. Additionally, firms with superior culture are shown to have higher long-term credit ratings. These findings contribute at the confluence of corporate culture and debt financing literatures. A battery of robustness tests, including addressing endogeneity concerns, validate the findings.

1. Introduction

Corporate decisions are made in a complex and dynamic environment. Corporate culture, shaped by the firm's values, beliefs and norms, can add a layer of complexity with significant influence on corporate finance decisions. One major financing decision is the firms' debt maturity choice. In particular, understanding the determinants of corporate debt maturity structure occupies an important place in the finance literature. Previous studies document that debt maturity is affected by the firm's quality (Guedes and Opler, 1996), agency costs (Barclay and Smith, 1995), size and asset maturity (Stohs and Mauer, 1996), information asymmetries (Berger et al., 2005), growth opportunities (Billett et al., 2007), asset liquidation values (Benmelech, 2009), executive characteristics, such as the managerial stock ownership (Datta et al., 2005), and the top executive gender (Datta et al., 2021), as well as macro-variables, such as the prevailing policy uncertainty (Datta et al., 2019), and changes in the supply of long-term government bonds (Greenwood et al., 2010; Badoer and James, 2016). However, the literature is silent on the effect of corporate culture in debt maturity choice. In this paper, we seek to fill this gap.

Graham et al. (2022) state that "*Among the items that executives believe drive value, corporate culture is the most under-researched.*" Culture embodies a cohesive system of values that shape the way individuals think, act, take decisions, and relate to other individuals in a group (Hofstede, 2001). Recognizing the critical influence of culture, researchers have started to investigate how the system of values shared by employees permeate the firms' financial decisions, their attractiveness, long-term orientation, and reputation. However, the investigation remains limited.

Our study contributes to three streams of literature. First, it adds a new dimension to the body of research on the determinants of a firm's debt maturity structure by utilizing a firm-specific measure of corporate culture.[1] Arguably, a firm-level measure of corporate culture is expected to play a stronger (more intimate) role on the firms' debt maturity structure decision compared to the influence of macro-level culture. Second, our paper builds on the growing literature

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[1] Prior studies focus exclusively on the effect of macro-level culture (national culture and county-level culture) on debt maturity. For example, Zheng et al. (2012) study the relationship between national culture and the corporate debt maturity and find evidence supporting the idea that firms located in countries with high uncertainty avoidance, high collectivism, high power distance, and high masculinity – all factors used to proxy for the country-level culture – use more short-term debt, while Huang and Shang (2019) show that firms located in areas with a high degree of altruistic tendency and mutual trust, as measured by the county-level social capital, need less mechanisms to alleviate agency conflicts and, therefore, use less short-term debt.

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that shows the importance of intangibles for firm value. For example, Edmans (2011) scores companies in four categories capturing the degree of employee satisfaction (i.e., credibility, respect, fairness, and pride/camaraderie) and argues that firms with high levels of employee satisfaction generate superior long-term returns even after controlling for industries or factor risk. More recently, Belo et al. (2022) document that non-physical capital inputs account for the majority of firms' market value, with a share between 70 and 80 percent. Third, the study adds to the recent evidence on the implications of corporate culture. Guiso et al. (2015) find that one of the main functions of corporate culture is to attract employees with a similar value system. They show that integrity in corporate culture is associated with high Tobin's Q, profitability, and less unionization.

Other papers in this domain focus on the effects of corporate culture on mergers and acquisitions (M&As) and find that the outcome of a merger and acquisition, as well as the probability of being acquired, is a function of the cultural similarities between the acquirer and the target (see, e.g., Morosini et al., 1998; Van den Steen, 2010; Ahern et al., 2015; Tremblay, 2020). Corporate culture also plays an important role in corporate risk-taking (Graham et al., 2022), even when regulatory changes are in place (Hirtle et al., 2020). Recently, Li et al. (2021) show that corporate culture promotes efficiency and positively contributes to firm value. Our study contributes to the analysis of the role of corporate culture on firms' decisions.

Using a sample of 12,491 firm-year observations for the sample period 2002–2017, we empirically test the relationship between corporate culture and firms' debt maturity. We measure corporate culture using the composite measure constructed by Li et al. (2021) who use a machine-learning approach to summarize the five most cited values by S&P500 firms on their website, i.e., *Innovation*, *Integrity*, *Quality*, *Respect*, and *Teamwork*.[2] Using a two-stage least square regression model to account for the simultaneous choice of leverage and debt maturity, we show that firms characterized by a stronger cultural environment have shorter maturity than firms with a weaker cultural environment. Our results are both statistically and economically meaningful. In fact, we find that a one standard deviation increase in the culture variable increased the use of short-term debt due in one year by 6.65%, the fraction of short-term debt due in three years by 5.26%, and that maturing in five years by 2.72%. Our findings suggest that in firms with a stronger culture, executives are more constrained in their opportunistic behaviors and are less likely to avoid external monitoring activities, such as those associated with the use of shorter-term debt, which is traditionally known to expose firms to a more frequent scrutiny from capital markets.

We perform a battery of robustness tests to validate our results. We show that our results hold when we control for the firm investment in socially responsible activities (CSR) and the social capital in the county where the firm is headquartered. Our results are also robust to the inclusion of firm fixed effects, macro- and executive-specific controls, the use of lagged values for corporate culture, as well as alternative definitions for firm culture. We address the endogeneity concerns that may arise in our set-up using two methodologies, i.e., a propensity score matching approach and an instrumental variable approach. We show that regardless of how we address for endogeneity, the positive and significant effect of corporate culture on short-term debt holds.

Our cross-sectional analyses further deepen our understanding of the relationship between corporate culture and debt maturity structure. We find that firms tend to choose debt of even shorter maturity when (1) executives hold a large fraction of equity, and (2) when firms face financial constraints. We also note that the relationship between corporate culture and debt maturity is weakened for firms with a greater CEO sensitivity to stock prices. Further, as the corporate culture measure is a composite of five subcomponents (*Innovation*, *Integrity*, *Quality* , *Respect*, and *Teamwork*), we investigate which of the five subcomponents play a role in the firms' debt maturity structure decision. We find that integrity, teamwork, and innovation play a discernible role in this decision.

Finally, applying the propensity score matching technique, we test the role of culture on corporate long-term credit ratings and find that firms with stronger culture have higher ratings and, consequently, they are expected to benefit from a lower cost of capital. This finding supports the notion that firms benefit from a better reputation.

The remainder of the paper is organized as follows. Section 2 presents the theories and hypotheses that connect corporate culture to debt maturity. Section 3 describes the data, our sample selection criteria, and the summary statistics. Section 4 presents our baseline results, along with some robustness tests. Section 5 reports tests to address endogeneity concerns. Sections 6 and 7 focus on the moderating roles of managerial stock ownership, CEO Delta, and firms' financial constraints in the relationship between corporate culture and debt maturity structure choice, respectively. Section 8 looks at all the different subcomponents of the composite culture measure. Section 9 describes the effect of corporate culture on long-term credit ratings. Section 10 concludes.

2. Theory and hypotheses development

In this section, we develop testable hypotheses linking firm-specific culture to debt maturity structure. Since culture could affect the corporate debt maturity choice in different ways, we propose two competing hypotheses.

2.1. Corporate culture, agency conflicts, and debt maturity structure

The influence of culture on economic outcomes, human behavior and decision-making is well rooted in the literature. Based on Williamson (2000), Licht et al. (2005) note that culture conditions formal institutions, and hence indirectly affects economic outcomes. Hofstede (2001) defines culture as the collective mental programming that leads to patterned ways of thinking, feeling, and acting and that distinguishes one group or category of people from another. North (1990) states that, "*culture provides a language-based conceptual framework for encoding and interpreting the information that the senses are presenting to the brain* (p. 37)," thereby shaping human actors' perceptions of the external world and influencing their decisions, attitudes, and behaviors.

Prior empirical research has related culture to economic activities. For instance, Zheng et al. (2012) observe that culture exerts a direct impact on economic activities through its role as an informal constraint on opportunistic behaviors. They claim that culture can significantly affect agents' decision-making processes, shape their incentives, and direct their perceptions of the surrounding environment.

While the influence of national culture on economic decisions have been well documented in previous studies (e.g., Li et al., 2011; Zheng et al., 2012), the effect of corporate (firm-level) culture on firm decisions is a relatively new research domain. Firm-level culture is expected to play a more direct role in corporate decision-making than macro-level culture. Hence, it is natural to explore the impact of corporate culture on one of the major corporate finance decisions, namely the debt maturity structure.

Guiso et al. (2015) find that one of the main goals of corporate culture, intended as a system of shared values, is to attract employees with a similar value system, which positively affects the firm value and performance. Pacelli et al. (2022) document that culture is a fundamental attribute to attract valuable job seekers, given the increased interest towards non-pecuniary perks. Other works have shown that cultural values play a role in M&A activities. For example, Chakrabarti et al. (2009) find that the culture of the acquirer and the target plays a crucial

[2] We are grateful to Professor Kai Li for providing the corporate culture measure.

role in cross-border acquisitions as these are shown to perform better in the long-run if both the acquirer and the target come from countries that are culturally diverse. Recently, Li et al. (2021) find a positive association between corporate culture, its operational efficiency and overall firm value. This benefit extends even in crisis periods, such as during the COVID-19 pandemic, thus reinforncing the idea that having a strong corporate culture, promotes integrity, enhances trust, and stimulates a collaborative attitude that permeate corporate decision-making.

Based on the above discussion, we posit that managers in firms with a more developed cultural environment are less likely to misbehave, or act opportunistically in a self-serving manner, and in general, are less likely to take actions that may harm investors. This can be due to multiple reasons, e.g., the company reflecting the managers' values, their philosophy, their long-term orientation and prospects, and their concern about corporate reputation. Through each of these channels, the managers are more likely to be perceived by investors as trustworthy, less likely to be exposed to conflicts of interest, and to generate agency problems. Therefore, we reason that firms with a stronger culture are those where, given the better cultural environment, managers are less likely to escape from monitoring activities.

This study focuses on the monitoring device predicated on the choice between long-term and short-term debt. Particularly, as shorter-term debt comes up for more frequent renewal, it has the benefit of reducing the agency costs arising from managerial misbehaviors by subjecting them to more frequent external market monitoring (Rajan and Winton, 1995; Stulz, 2001). Opportunistic managers, therefore, have an incentive to avoid more frequent monitoring by choosing longer-term debt (Datta et al., 2005). In this context, we add that opportunistic managers are more likely to be associated with poorer firm-culture.

Given that a stronger firm-level culture is expected to align managers and shareholders interests more effectively, we hypothesize that, in these firms, managers will be more receptive to being monitored more frequently via short-term debt. Hence, we propose the following hypothesis:

Hypothesis 1. To the extent that a better cultural environment reduces agency conflicts, firms with superior culture will choose shorter term debt.

Based on the above discussion, it can also be argued that there may be a substitution effect in firm monitoring between corporate culture and short-term debt. Specifically, in firms with superior cultural environment, there may be a reduced need for external monitoring via short-term debt. Hence, we propose the following hypothesis:

Hypothesis 2. To the extent that firms with superior culture are associated with lower exposure to managerial agency costs, hence substituting the need for more frequent external monitoring via short-term debt, firms with better culture will choose relatively longer-term debt.

3. Data, sample formation, and summary statistics

We describe our sample selection process, the construction of key variables, and the covariates used in the estimations in this section. Detailed variable definitions are in Appendix.

3.1. Data and sample formation

The Culture measure is obtained from Li et al. (2021). It is a composite measure that captures the following five dimensions of culture: *Innovation*, *Integrity*, *Quality*, *Respect*, and *Teamwork*. These five dimensions of culture and the composite *Culture* measure are generated using a word embedding model and a machine learning technique applied to earnings call transcripts from Thomson Reuters' StreetEvents (SE) database spanning the period 2002 to 2017.[3] As explained by Li et al. (2021), the use of earnings call to score corporate culture allows to capture the managerial contribution to it. Earnings calls, in fact, are a commonly employed external corporate communication channel involving mostly CEOs and sometimes other top executives speaking to analysts, able to reveal the set of values that are important to those corporate leaders and their company.[4] Further, the use of earnings call allows to mitigate the concerns that the corporate values are mostly driven by self-promotion talks by managers, and to construct a more exhaustive culture dictionary. We refer to Section 1 of the Internet Appendix in Li et al. (2021) for a more detailed description of the procedure used to construct the *Culture* variable.

Following Barclay and Smith (1995), we restrict our sample to firms with Standard Industrial Classification (SIC) codes from 2000 to 5999 (industrial firms). A similar approach is used in Barclay et al. (2003), Datta et al. (2005), and Brockman et al. (2010). Since our goal is to study the relationship between corporate culture and the choice of debt maturity structure, we require COMPUSTAT to have data available for long-term debt due in one, three, and/or five years at fiscal year end. Further, we discard firm-year observations where the total debt maturity is less than 0 or more than 100 percent. Firm-specific controls are matched to the corporate culture variable using the GVKEY identifier, as well as the fiscal year-end. Our selection process yields 12,491 firm-year observations.

3.2. Summary statistics

Summary statistics for salient variables are reported in Table 1. Panel A presents the aggregate summary statistics for firm-level characteristics. The dependent variables, namely ST1, ST3, and ST5, show that, on average, firms in our sample have 9.90%, 30.04%, and 53.05% of their debts due within one, three, and five years, respectively. The debt maturity structure and the control variables in our sample are consistent with those reported by Datta et al. (2005) and Brockman et al. (2010). The average *Culture* value in our sample is 13.03 with a standard deviation of 4.45 suggesting that there is significant variation for this variable across the entire sample.

Panel B compares the sample firms with high *Culture* values (i.e., above-median cultural values) versus those with low *Culture* values (i.e., below median cultural values). We note that firms with higher cultural values also have significantly greater CSR scores, are typically smaller, have greater growth opportunities, less leverage, a lower fraction of tangible assets, and lower profitability than their counterparts with lower cultural values. Further, we observe that 47.7% of the firms in the high *Culture* sub-sample have a credit rating, and only 25.2% of these firms' debt are rated investment-grade. Finally, as a preliminary support for our Hypothesis 1, we find that firms with superior cultural values are associated with significantly more short-term debt due in one, three, and five years than their counterparts.

4. Empirical results

4.1. Baseline model and results

We follow Johnson (2003) and Datta et al. (2005), to model leverage and debt maturity as simultaneously determined. Hence, we employ a two-stage least squares regression model with the endogenous variable, leverage, as the dependent variable in the first stage, and debt maturity as the dependent variable in the second stage.

[3] Our choice of the sample period is dictated by data availability. We start from the year 2002 because debt maturity data are more populated after this year. We stop at 2017 because S&P credit rating data are not available after this year.

[4] Graham et al. (2022) also recommend earnings calls as the primary avenue for measuring corporate culture.

Table 1
Summary statistics.

Panel A: Full sample

Variables	N	Mean	Median	STD
ST1 (%)	12,491	9.904	2.564	19.382
ST3 (%)	12,491	30.036	19.984	31.144
ST5 (%)	12,491	53.045	48.533	33.729
Culture	12,491	13.030	12.267	4.450
CSR	9377	−0.032	0	0.519
Social cap	8676	−0.349	−0.294	0.792
Size	12,491	7.929	7.909	1.893
MTB	12,491	1.816	1.466	1.297
Leverage (%)	12,491	17.378	14.569	14.218
ABN_Earn	12,491	0.351	0.005	26.503
AssetMat (years)	12,491	11.290	7.119	28.087
Term (%)	12,491	1.954	2.261	1.030
Volatility	12,491	0.110	0.090	0.073
Fixed assets	12,491	0.298	0.229	0.223
Profitability	12,491	0.103	0.118	0.170
% of firms with TLCF	12,491	53.12		
% of firms with ITC	12,491	20.58		
% of rated firms	12,491	56.38		
% investment grade firms	12,491	30.81		

Panel B: High vs. Low culture

Variables	*High Culture*		*Low Culture*		P-value
	N	(Mean)	N	(Mean)	of diff.
ST1 (%)	6243	11.904	6248	7.906	<.0001
ST3 (%)	6243	33.739	6248	26.336	<.0001
ST5 (%)	6243	56.358	6248	49.736	<.0001
Culture	6243	16.400	6248	9.662	<.0001
CSR	4386	0.017	4991	−0.075	<.0001
Social cap	4532	−0.329	4144	−0.367	0.02
Size	6243	7.690	6248	8.168	<.0001
MTB	6243	1.988	6248	1.644	<.0001
Leverage (%)	6243	15.737	6248	19.018	<.0001
ABN_Earn	6243	0.512	6248	0.190	0.50
AssetMat (years)	6243	9.989	6248	12.590	<.0001
Volatility	6243	0.118	6248	0.101	<.0001
Fixed assets	6243	0.259	6248	0.337	<.0001
Profitability	6243	0.079	6248	0.128	<.0001
% of firms with TLCF	6243	0.573	6248	0.490	<.0001
% of firms with ITC	6243	0.212	6248	0.200	0.11
% of rated firms	6243	0.477	6248	0.651	<.0001
% investment grade firms	6243	0.252	6248	0.364	<.0001

This table reports the summary statistics for variables constructed based on the sample of U.S. public firms from 2002 until 2017. Panel A considers the full sample. Panel B looks at the comparison between firms classified as having *High Culture* (above-median *Culture* score) versus firms classified as having *Low Culture* (below-median *Culture* score). Definitions of variables are listed in Appendix.

In the first stage, we measure the dependent variable, *Leverage*, as the ratio of long-term debt to the market value of total assets (multiplied by 100) and we control for variables that prior literature (see, e.g., Johnson, 2003; Barclay and Smith, 1995) has shown to have an impact on corporate leverage. We estimate Eq. (1) described as follows:

$$\begin{aligned} Leverage_{it} = {} & \alpha + \gamma_s + \tau_t + \beta_1 Size_{it} + \beta_2 MTB_{it} + \beta_3 FA_{it} \\ & + \beta_4 Profitability_{it} + \beta_5 ABN\_Earn_{it} + \beta_6 REG_{it} \\ & + \beta_7 Volatility_{it} + \beta_8 TLCF_{it} + \beta_9 ITC_{it} \\ & + \beta_{10} Culture_{it} + \varepsilon_{it}. \end{aligned} \quad (1)$$

To determine leverage (*Leverage*), we include *Size*, to control for scale issues, *MTB*, to account for the firm's growth opportunities, *FA*, capturing the firm's collateral value, *Profitability*, measuring the creditworthiness of firms and their potential access to capital markets, *ABN_Earn*, to control for firm quality, and *Volatility*, which proxies for the firm's riskiness. In addition to that, we add dummy variables taking a value equal to one if the firm is regulated (*REG*), has operating loss carryforwards (*TLCF*), and has investment tax credits (*ITC*), and zero otherwise. Finally, we augment model (1) with the variable *Culture*, measuring the firm cultural dimension. *FA*, *Profitability*, *TLCF*, and *ITC* are instruments in the first stage (see, e.g., Datta et al., 2005). We control for year and 3-digit SIC industry fixed effects by including τ_t and γ_s, respectively. Standard errors are clustered at the firm level. All variables are defined in Appendix.

In the second stage, following Datta et al. (2005), we measure the dependent variable as the percentage of debt maturing within one, three, or five years as a percent of total debt, multiplied by 100. We estimate the following model[5]:

$$\begin{aligned} ST1_{it+1}\ (ST3_{it+1}, ST5_{it+1}) = {} & \alpha + \gamma_s + \tau_t + \beta_1 Culture_{it} + \beta_2 Size_{it} \\ & + \beta_3 Size_{it}^2 + \beta_4 MTB_{it} + \beta_5 \widehat{Leverage}_{it} \\ & + \beta_6 ABN\_Earn_{it} + + \beta_7 AssetMat_{it} \\ & + \beta_8 Rating_{it} + \beta_9 INVG_{it} \\ & + \beta_{10} Term_{it} + \beta_{11} Volatility_{it} + \varepsilon_{it}. \end{aligned} \quad (2)$$

As shown in Eq. (2), the decision variables of interest (e.g., percentage of debt maturing in one/three/five years or less as a percent of

[5] Leverage represents the predicted values from the first stage regression model described in Eq. (1).

total debt) are defined at time *t*.[6] Our focus variable, defined at time *t*, is *Culture*, which is a continuous variable. All control variables are defined at time *t*. The inclusion of these variables is justified by prior theoretical and empirical literature on debt maturity choice.

Following Barclay et al. (2003) and Johnson (2003), we add firm size (*Size*) and ($Size^2$) to proxy for the firm's ability to access external capital, as well as the documented non-linear relationship between size and debt maturity (see, e.g., Diamond, 1991). Based on this reasoning, we expect a negative coefficient for β_2 and a positive coefficient for β_3.

Firms with higher market-to-book ratios are traditionally viewed as smaller firms with more growth opportunities. These firms are also likely to be credit constrained and reliant on short-term financing (Myers, 1977). We thus expect the coefficient β_4 to be positive. Following a similar argument, firms with higher debt ratios may have low creditworthiness and resort more to short-term debt. We expect the coefficient β_5 to be positive. Similarly, we expect the coefficients for β_6, β_9, and β_{11} to be positive. Firms with more earnings and those with an investment grade credit rating are typically not reluctant to the monitoring activity associated with short-term debt, so we expect these firms to show a shorter maturity of debt. Also, firms characterized by a greater volatility of stock market returns, as captured by the variable *Volatility*, are more likely to resort to short-term debt if longer-term debt is denied.

Along with the investment grade dummy, we control for whether firms have been rated at all from a credit rating agency (*Rating*). Firms with a credit rating have a lower degree of information asymmetry and may benefit from easier access to longer-maturity debt. Following this argument, we would expect the coefficient β_8 to be negative. Further, since firms tend to match the maturity of their assets and liabilities (Myers, 1977), we expect the coefficient on *AssetMat* (β_7) to be negative. Finally, based on the tax hypothesis proposed by Barclay and Smith (1995), we expect the coefficient β_{10} on the term structure variable (*Term*) to be negative.

To limit the influence of outliers, we winsorize the variables at the 1% cutoff. Time and industry fixed effects are included to control for time-invariant industry-specific factors that may be correlated with omitted variables.[7] We use White's heteroskedasticity-corrected standard errors, clustered at the firm level, to draw statistical inference. The second stage regression results are presented in Table 2.[8]

Columns (1) and (4) report results for the fraction of debt due in one year, Columns (2) and (5) for the fraction of debt due in three years, and Columns (3) and (6) for the fraction of debt maturing in five years. Columns (1) to (3) include industry fixed effects, while columns (4) to (6) employ year *and* industry fixed effects. Supporting Hypothesis 1, we find that a better cultural environment is associated with a shorter debt maturity, regardless of the specification used. More specifically, looking at columns (4) to (6), we observe that there is a positive and highly significant relationship between the *Culture* variable and the fraction of debt due in one, three, and five years.

Our results are not just statistically significant, but they are also economically relevant. In terms of economic significance, a one standard deviation increases in the *Culture* variable improves the use of short-term debt due in one year by 6.65% ($= \frac{0.148\times4.45\times100}{9.904}$), increases the fraction of short-term debt due in three years by 5.26% ($= \frac{0.355\times4.45\times100}{30.036}$), and that maturing in five years by 2.72% ($= \frac{0.324\times4.45\times100}{53.045}$). Taken together, these findings provide support for Hypothesis 1, which establishes a positive and meaningful relationship between corporate culture and shorter-term debt maturity chosen by firms.

4.2. Robustness tests of baseline results

We perform a series of robustness tests of our baseline model. First, our results could be driven by other variables affecting the corporate values and identity, such as the social capital associated with the location of the headquarters, and engagements in socially responsible activities (CSR). Social capital is commonly thought to capture altruistic inclinations and norms. So, following prior literature (Grullon and Weston, 2010; Hilary and Hui, 2009), we use the norms in the headquarters' region as a proxy for the corporate norm to measure social capital. To capture socially responsible activities at the corporate level, instead, we follow Kim et al. (2012), Servaes and Tamayo (2013), and Lins et al. (2017), and define the *CSR score* variable using five categories related to community, environment, employees, diversity, and human rights. More details on the construction of these variables are provided in Appendix. We include *Social Capital* and *CSR Score* in the baseline regression model and present the results in Table 3, panel A, columns (1) to (6). Columns (1) to (3) show results after we include the *Social Capital* variable. In Columns (4) to (6) we add the firm-level *CSR Score*. Our results show that the positive and highly significant relationship between corporate culture and shorter-term debt maturity choice persists after controlling for these variables.[9]

Second, our results could be driven by time-invariant firm-specific characteristics. To address this issue, we estimate the baseline regression model (model (2)) but replace the industry fixed effects with firm fixed effects. Our results, presented in Table 3, panel B, show that our results hold and are robust to this alternative specification.

Third, the effect of corporate culture on the fraction of debt maturing within one, three, and five years could be affected by some macro-level variables. To address this issue, we include some relevant macro-economic controls in our baseline model (Eq. (2)), such as *GDP growth*, *Yield spread*, *Macro uncertainty*, *Short-term rate*, and *Recession dummy*. Again, these variables are defined in Appendix. Our results, presented in Table 3, panel C, indicate that the use of short-term debt increases during periods of financial crises. As documented earlier, the primary relationship between corporate culture and debt maturity structure remains robust to this model specification.

Fourth, prior literature has found that the debt maturity structure of firms can be significantly impacted by executive-specific variables. For example, Datta et al. (2005) document that managerial ownership is a crucial determinant for the debt maturity structure of firms. Datta et al. (2021) show that the top executive gender is another important factor to consider when analyzing the firm choice to use short-term over long-term debt. Following this stream of literature, we augment our baseline regression model using two variables; i.e., *StockOwn*, defined as the number of shares (excluding options) owned by both the CEO and CFO divided by common shares outstanding at the end of the fiscal year, and *Female*, which is a dummy variable that takes a value of one if the top executive, be it the CEO and/or the CFO, is a female. Our results, shown in Table 3, panel D, highlight a positive and statistically significant coefficient for both *StockOwn* and *Female*, suggesting that managerial stock ownership and top executive gender are important variables for the understanding of the debt maturity structure of firms. More importantly, we note that the coefficient on *Culture* is still positive and statistically significant, which further reinforces our earlier findings.[10]

[6] In a robustness test, we also show the validity of our results using the *Culture* values at time (t-1) and (t-2).

[7] The *Culture* score has limited within-firm variation with an autocorrelation coefficient of 0.98. Further, we observe that the average (median) firm in our sample has only 5.4 (3.9) years of observations which suggests that the time series variation in our variable of interest is not remarkable. Given the limited within-firm and time-series variation, we include industry dummies based on the 3-digit SIC industry classification in all our regression models. However, for robustness, we have also replicated our baseline results for model (2) adding firm fixed effects instead of industry fixed effects.

[8] The first-stage regression estimates are not reported but are available upon request.

[9] In unreported results, we also test the robustness of our results by including both the *Social Capital* and the *CSR Score*. Our findings are robust to this specification as well. Results are available to readers upon request.

[10] For the sake of clarity, we do not include *StockOwn* in the baseline regression model. We do so because including this variable significantly affects the sample size.

Table 2
Relation between corporate culture and debt maturity: 2SLS regression results.

	(1) ST1	(2) ST3	(3) ST5	(4) ST1	(5) ST3	(6) ST5
Culture	0.079	0.257***	0.335***	0.148*	0.355***	0.324***
	(0.23)	(0.01)	(0.00)	(0.06)	(0.00)	(0.01)
Size	−5.869***	−11.377***	−1.974	−7.107***	−12.446 ***	−0.835
	(<.0001)	(<.0001)	(0.35)	(<.0001)	(<.0001)	(0.74)
$Size^2$	0.281***	0.565***	0.036	0.365***	0.636 ***	−0.044
	(0.00)	(<.0001)	(0.78)	(0.00)	(<.0001)	(0.77)
MTB	0.466	1.295***	1.655***	0.911	1.800***	1.351 *
	(0.37)	(0.01)	(0.00)	(0.18)	(0.01)	(0.06)
$\widehat{Leverage}$	−0.452***	−0.153	0.379*	−0.236	0.025	0.182
	(0.01)	(0.47)	(0.09)	(0.36)	(0.93)	(0.58)
ABN_Earn	0.005***	0.012 ***	0.009***	0.004***	0.010***	0.009***
	(<.0001)	(0.00)	(<.0001)	(0.00)	(0.00)	(<.0001)
AssetMat	−0.004	−0.006	−0.022	−0.007	−0.009	−0.020
	(0.47)	(0.61)	(0.25)	(0.29)	(0.45)	(0.28)
Rating	0.862	−10.023***	−15.738***	−1.783	−11.850***	−13.238***
	(0.71)	(0.00)	(<.0001)	(0.53)	(0.00)	(0.00)
INVG	−2.330	3.255	−0.650	−0.676	3.927	−2.454
	(0.16)	(0.14)	(0.79)	(0.78)	(0.18)	(0.46)
Term	0.159	0.829***	−0.157	−9.304	−13.718	−12.136
	(0.41)	(0.01)	(0.63)	(0.14)	(0.15)	(0.27)
Volatility	23.934***	26.229***	2.323	12.290	2.827	4.101
	(0.00)	(0.01)	(0.83)	(0.26)	(0.83)	(0.77)
Year F.E.	No	No	No	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.294	0.562	0.764	0.295	0.566	0.765
N	12,491	12,491	12,491	12,491	12,491	12,491

This table shows the second stage regressions from 2SLS regression models where leverage and debt maturity are simultaneously determined. In the first stage, the endogenous variable, *Leverage*, is regressed on *Size, MTB, Fixed Assets, Profitability, ABN_Earn, Volatility, REG, TLCF, ITC,* and *Culture*. In the second stage, we use the percentage of debt maturing in one (*ST1*), three (*ST3*) and five years (*ST5*) or less as a percent of total debt as dependent variables and regress those variables on the leverage predicted values obtained from the first stage, $\widehat{Leverage}$, *Culture*, and a set of control variables affecting the debt maturity structure of firms (*Size*, $Size^2$, *MTB, ABN_Earn, AssetMat, Rating, INVG, Term*, and *Volatility*). Year and industry fixed effects are included. See Appendix for variable definitions. Numbers in parentheses are p-values, adjusted for heteroskedasticity and clustering at the firm level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Finally, we test the validity of our findings using two different definitions of *Culture*. In our baseline model, *Culture* is a continuous score, defined at time *t*, where higher values are associated with a more culturally developed corporate environment. In Table 3, panels E and F, we use lagged values for *Culture* (i.e., measured at time *t-1* and *t-2*) and replace the continuous variable with a dummy variable taking a value of one to identify firm-year observations where the corporate culture value is above the sample median (*High_Culture*). This additional check further assures the robustness of our results.

5. Endogeneity tests

Thus far, we assume that the direction of causality runs from corporate culture to the debt maturity structure of firms. Reverse causality would imply that the firm debt structure choice dictates the cultural environment within the firm, which is practically highly implausible. Nevertheless, to circumvent the potential criticism along these lines and to partially address the concerns regarding omitted variable biases, we apply two accepted econometric techniques: *Propensity Score Matching* and the *Instrumental Variables Method*.

5.1. Propensity score matching

To reduce the causality concerns that may affect the relationship between corporate culture and debt maturity choices, we employ a propensity score matching approach (Rosenbaum and Rubin, 1983). We begin with a probit regression that estimates the probability of receiving a treatment, i.e., having a high *Culture* score in our setting, using the same control variables employed in the baseline regression model as specified in Eq. (2).[11] We define the dummy variable *High_CultureQ4* identifying firm-year observations with a *Culture* score in the top quartile of the *Culture* distribution and then we use the propensity score to find a comparable firm-year with a bottom-quartile *Culture* score using the nearest neighbor matching algorithm with replacement to minimize the propensity score distance between the matched firm and the treatment firm (Hong et al., 2014).[12]

To ensure that any combination of characteristics observed in the treatment group can also be observed among the control group (Bryson et al., 2002), we implement the common support condition (Minutti-Meza, 2013). Further, we discard all observations whose propensity score is smaller than the minimum and larger than the maximum in the opposite group (Caliendo and Kopeinig, 2008). Further, we make sure that the matching approach is appropriate by using a caliper width of 0.2 (Austin, 2011), and then check the robustness of our results using an alternative caliper of 0.1. This methodology provides 3111 unique pairs of matched firms-years. Unreported results show that the difference in mean values for the matching firm-specific characteristics between the treated and the control samples are not statistically significant, thus implying that the matching is tight and appropriate.

Our findings for the propensity score matching approach are presented in Table 4. Regardless of the dependent variables used, we note that the coefficient for *Culture* is always positive and statistically significant (i.e., at the 5% level when the dependent variable is either ST1 or ST5, and at the 1% level when the dependent variable is ST3). These results reinforce our finding that corporate culture plays a crucial role in the determination of the corporate debt maturity structure.

[11] We replicate the first stage of the propensity score matching approach by using a *conditional* logistic regression model and get similar results.

[12] To circumvent the concern that replaced observations with extreme propensity scores are matched many times, and thus, are heavily weighted (Lawrence et al., 2011), as a robustness check, we use a matching algorithm that does not allow for replacement. The results are unchanged.

Table 3
Robustness tests to baseline model.

Panel A: Controlling for Social Capital and CSR						
	(1) ST1	(2) ST3	(3) ST5	(4) ST1	(5) ST3	(6) ST5
Culture	0.159*	0.471***	0.400***	0.176**	0.412***	0.362**
	(0.10)	(0.00)	(0.00)	(0.03)	(0.00)	(0.02)
Social cap	0.201	−0.257	−1.458**			
	(0.56)	(0.63)	(0.04)			
CSR Score				−0.212	−0.285	−1.259
				(0.70)	(0.74)	(0.23)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.285	0.572	0.777	0.288	0.564	0.779
N	8676	8676	8676	9377	9377	9377

Panel B: Controlling for firm fixed effects			
	(1) ST1	(2) ST3	(3) ST5
Culture	0.172***	0.159**	0.149*
	(0.00)	(0.05)	(0.07)
Firm controls	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes
Adjusted R^2	0.469	0.649	0.826
N	12,491	12,491	12,491

Panel C: Controlling for macro variables			
	(1) ST1	(2) ST3	(3) ST5
Culture	0.129*	0.359***	0.0.332***
	(0.07)	(0.00)	(0.00)
GDP growth	0.084	−0.125	−0.796***
	(0.52)	(0.53)	(<.0001)
Yield spread	0.283	2.381*	0.909
	(0.74)	(0.06)	(0.49)
Macro uncertainty	4.210	12.263**	−8.307
	(0.32)	(0.05)	(0.17)
Short-term rate	0.825***	1.048***	0.015
	(0.00)	(0.00)	(0.97)
Recession dummy	−0.019	3.173***	2.274**
	(0.98)	(0.00)	(0.03)
Firm controls	Yes	Yes	Yes
Year F.E.	No	No	No
Industry F.E.	Yes	Yes	Yes
Adjusted R^2	0.295	0.566	0.765
N	12,491	12,491	12,491

Panel D: Controlling for executive variables			
	(1) ST1	(2) ST3	(3) ST5
Culture	0.139*	0.321***	0.339**
	(0.07)	(0.01)	(0.03)
Female	0.854	3.887***	4.292***
	(0.32)	(0.00)	(0.01)
StockOwn	0.135	0.244**	0.116
	(0.22)	(0.02)	(0.34)
Firm controls	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes
Adjusted R^2	0.271	0.559	0.774
N	8669	8669	8669

(*continued on next page*)

Table 3 (*continued*).

Panel E: Culture at time (t−1) and (t−2)						
	(1) ST1	(2) ST3	(3) ST5	(4) ST1	(5) ST3	(6) ST5
Culture (t−1)	0.168** (0.04)	0.425*** (0.00)	0.432*** (0.00)			
Culture (t−2)				0.108 (0.19)	0.340*** (0.00)	0.502*** (0.00)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.291	0.566	0.769	0.282	0.562	0.771
N	11,126	11,126	11,126	9910	9910	9910

Panel F: Dummy variable for *Culture*			
	(1) ST1	(2) ST3	(3) ST5
High Culture	1.042** (0.03)	1.749** (0.02)	1.872** (0.03)
Firm controls	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes
Adjusted R^2	0.295	0.566	0.765
N	12,491	12,491	12,491

This table shows robustness tests for our baseline regression model (Eq. (2)). Our variable of interest is *Culture*, a composite culture measure developed by Li et al. (2021) summarizing corporate values on innovation, integrity, quality, respect, and teamwork.. Panel A studies the effect of corporate culture on short-term debt controlling for investment in corporate social responsibility policies (CSR Score) and social capital (Social cap). Panel B tests the baseline regression model with year and firm fixed effects. Panel C tests the relationship between corporate culture and short-term debt with the inclusion of macro-factors (*GDP growth, Yield spread, Macro uncertainty, Short-term rate,* and the *Recession dummy*). Panel D augments the baseline model with executive-specific variables such as the executive gender *Female* and the executive stock ownership *StockOwn*. Panel E uses lagged values for *Culture* ($Culture_{t-1}$, $Culture_{t-2}$). Panel F uses a dummy variable (*High Culture*) to identify firm-year observations with an above-median *Culture* score. In all our specification models, we control for the leverage predicted values (obtained from the first stage regression model), $\widehat{Leverage}$, and a set of control variables affecting the debt maturity structure of firms (*Size,* $Size^2$, *MTB, ABN_Earn, AssetMat, Rating, INVG, Term*, and *Volatility*). See Appendix for variable definitions. Numbers in parentheses are p-values, adjusted for heteroskedasticity and clustering at the firm level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

5.2. Instrumental variable approach

We use the instrumental variables as an additional approach to address the endogeneity issue. The idea is to find an instrument that is correlated with the potential endogenous variable, *Culture*, but uncorrelated with the outcome variable, i.e., the fraction of short-term debt used by firms. In our analysis, we use two instruments, i.e., the 3-digit SIC industry average of Culture (without the firm for which the instrument is being calculated), and the 3-digit zip code average of Culture (minus the firm for which the instrument is being calculated).[13]

We employ the average corporate culture score of the neighbor firms in the same 3-digit zip code (*Culture3ZIP*) for two reasons. First, this variable is likely to be related to the *Culture* score of any given firm. It is, in fact, reasonable to assume that firms in the same geographical area share the similar corporate cultural values. As such, it is expected to satisfy the *relevance* requirement for an instrumental variable. In addition, it plausibly meets the *exclusion* requirement; that is, it is expected to be uncorrelated with the firm's debt structure choice. The US Postal Service allocates zip codes exclusively based on efficiency in postal delivery, not corporate financial policies or outcomes. Thus, the variation in corporate culture across zip codes is likely exogenous, an argument that is similar in spirit to the one made by Jiraporn et al. (2014), who use the variation of CSR policies at the geographical level to investigate the relationship between CSR on credit ratings.

In order to be able to execute a test of overidentifying restrictions, we also use a second instrument, based on the 3-digit SIC industry classification (*Culture3SIC*). The idea we exploit here is that the corporate debt structure choice is likely to be related to the *firm* -level culture, but less likely to be related to the *industry*-level culture, more so if the industry incorporates many firms. Therefore, we use the two instruments for *Culture* and present the results of the instrumental variable approach in Table 5.[14] Given that in our model we have two endogenous variables, *Culture* and *Leverage*, we present two first-stages for each of the two endogenous variables. The first stages are presented in columns (1) and (2), while the second stage results are presented in columns (3) to (5), respectively.

Focusing on the first stage for *Culture*, we observe that both instruments, *Culture3SIC* and *Culture3ZIP*, are positive and statistically significant at the 1% level thus indicating that the two instruments are correlated with the endogenous variable, *Culture*, and satisfy the relevance condition for an instrumental variable. Further, looking at the second stage regression estimates, we observe that the coefficients on the instrumented *Culture* variable, ($\widehat{Culture}$), are always positive and statistically significant, indicating that there exists a positive and possibly *causal* effect of corporate culture on short-term debt.

Additionally, we compare the coefficients for *Culture* from the baseline regression model (Table 2) with those from the instrumental variable regression model (Table 5) and note that our IV coefficients are larger. For example, the coefficient for *Culture* when the dependent variable is ST1 is 0.148 in Table 2 (when including year and industry fixed effects) and 0.235 in Table 5. We find a similar pattern when we look at ST3 or ST5 as dependent variable. Specifically, the coefficient for *Culture* in Table 2 is 0.355 when the dependent variable is ST3 and 0.324 when the dependent variable is ST5, in comparison it is 0.367

[13] Our approach is similar to Cheng et al. (2014) that look at the link between firm CSR performance and credit constraints.

[14] We acknowledge that aggregating the *Culture* variable at the industry and zip level may generate some concerns. In fact, some may argue that endogeneity at the individual firm level is simply soaked up at any group level. However, the *Culture* variable is highly persistent and constructing an instrumental variable for it is not an easy task in our set-up.

Table 4
Propensity score matching specification.

	(1) ST1	(2) ST3	(3) ST5
Culture	0.173**	0.297***	0.283**
	(0.03)	(0.01)	(0.03)
Size	−6.705***	−11.813***	−0.906
	(0.00)	(<.0001)	(0.74)
$Size^2$	0.327***	0.581***	−0.034
	(0.00)	(<.0001)	(0.83)
MTB	0.623	1.610***	1.726***
	(0.33)	(0.01)	(0.00)
$\widehat{Leverage}$	−0.445*	−0.281	0.158
	(0.09)	(0.37)	(0.62)
ABN_Earn	0.005**	0.013 ***	0.009***
	(0.02)	(<.0001)	(0.00)
AssetMat	−0.047	−0.071	−0.115**
	(0.13)	(0.19)	(0.03)
Rating	2.107	−6.808	−12.225**
	(0.57)	(0.14)	(0.02)
INVG	−4.241	−0.470	−3.960
	(0.21)	(0.91)	(0.38)
Term	−7.103	−19.052	−15.301
	(0.41)	(0.14)	(0.34)
Volatility	15.512	8.595	4.728
	(0.14)	(0.52)	(0.73)
Year F.E.	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes
Adjusted R^2	0.306	0.576	0.763
N	6222	6222	6222

This table shows propensity score matching (PSM) results. First, we run a probit regression to pair firm-year observations with top-quartile cultural values with firm-year observations with bottom-quartile cultural values based on the same set of control variables used in the baseline regression model (2), with the inclusion of industry and year fixed effects. Then we run a regression of the decision variables of interest (*ST1*, *ST3* or *ST5*) on the *Culture* variable and a set of control variables ($\widehat{Leverage}$, *Size*, $Size^2$, *MTB*, *ABN_Earn*, *AssetMat*, *Rating*, *INVG*, *Term*, and *Volatility*). Year and industry fixed effects are included. See Appendix for variable definitions. Numbers in parentheses are p-values, adjusted for heteroskedasticity and clustering at the firm level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

and 0.483, respectively, in Table 5, when we use the IV methodology. This difference in coefficients between the baseline model and the IV model demonstrates that correcting for endogeneity is important. Without correcting for endogeneity, in fact, the impact of corporate culture on the firm's debt structure choice would be underestimated.

Finally, we execute some endogeneity tests to ensure the validity of our results. Our instruments pass the statistical tests for strength, validity, and appropriateness. A commonly used test for the strength of the instruments is the F-test that jointly tests the significance of the instruments. In our case, the F-statistic is above the recommended minimum threshold of 10. This indicates the appropriateness and strength of the instruments chosen. The *p*-value for the Hansen J-statistic for over-identification is 0.48. This value indicates that we do not have more IVs than are necessary and our instrument choice is valid. Additionally, we observe that the null that *Culture* is exogenous is rejected, suggesting that instrumenting our variable of interest is econometrically appropriate. In sum, our instrumental variable analysis indicates the robustness of our finding that corporate culture is a significant determinant of a firm's debt maturity structure choice.

6. Corporate culture, managerial stock ownership, and debt maturity choice

The relationship between ownership structure and firm capital structure has been widely explored in the literature. Prior works have shown that larger executives' equity-based compensation increases managerial risk-taking attitude (see, e.g., Brockman et al., 2010), which may drive managers to prefer short-term over long-term debt. Datta et al. (2005) document that managers with higher stock ownership choose a larger proportion of short-maturity debt. Their rationale is that managerial stock ownership is an effective disciplining mechanism, able to align shareholders' and managers' interests. As such, managers with a larger stock ownership are less concerned about escaping from frequent monitoring and more likely to use short-term debt compared to their counterparts (with lower equity ownership) whose compensation is less aligned with shareholder interests.

Invoking these arguments, we should expect a pronounced effect of corporate culture on the firm use of short-term debt when managers hold a larger fraction of the equity stake. However, a different point of view is offered by Benmelech (2006), who argues that managerial entrenchment, proxied by the existence of a controlling blockholder holding at least 20% of the firm equity, is associated with more long-term debt, which, compared to short-term debt, is characterized by a lower liquidation risk. Following this latter reasoning, we would expect an insignificant or a dampened effect of corporate culture on debt maturity.

We proceed to empirically test the role of stock ownership in moderating the relationship between corporate culture and debt maturity structure using the following model:

$$ST1_{it+1}\ (ST3_{it+1}, ST5_{it+1}) = \alpha + \gamma_s + \tau_t + \beta_1 Culture_{it} + \\ + \beta_2 Culture_{it} \times StockOwn_{it} + \beta_3 StockOwn_{it} \\ + \theta X_{it} + \varepsilon_{it}. \quad (3)$$

In model (3), we augment the baseline model (model (2)) with the continuous variable for stock ownership (*StockOwn*) and the interaction term between corporate culture (*Culture*) and stock ownership (*StockOwn*). Our coefficient of interest is β_2, capturing the moderating effect of executive stock ownership in the relationship between corporate culture and the use of short-term debt. We use the same set of control variables and assumptions about standard errors as in the baseline model.

Results for this cross-sectional test are presented in Table 6. Our analysis highlights two important findings. First, corporate culture has a positive impact on the fraction of debt maturing in three and five years. Second, the effect of corporate culture on debt maturity is magnified when executives hold a large fraction of the firm equity. This test further reinforces the idea that firm-level culture is an important determinant of corporate debt maturity structure choices. Further, the relationship we document shows important cross-sectional variations, especially when we account for the managerial ownership structure.

6.1. Corporate culture, CEO delta, and debt maturity choice

Stock ownership is only one of the possible managerial incentive tools. In this subsection, we analyze the role played by CEO *Delta*, the sensitivity of CEO compensation to stock price, on the relationship between corporate culture and debt maturity structure. The CEO Delta is widely recognized to be another effective managerial disciplining mechanism. Analyzing the sensitivity of CEO compensation to stock price is thus fundamental in understanding a firm's capital structure choice.[15] This analysis offers insights into how closely aligned executive incentives are with shareholder value and risk management strategies. In fact, a higher sensitivity of CEO compensation to stock price signifies a stronger alignment of interests between executives and shareholders, encouraging decisions that enhance shareholder wealth. Meanwhile, examining the CEO Delta also offers insights into whether and how effectively top executives face and manage risk, which is an important factor to consider when determining the optimal firms' capital structure especially during periods of market uncertainties.

[15] We thank an anonymous referee for suggesting looking at this relationship.

Table 5
Instrumental variable specification.

	First stage		*Second stage*		
	(1) Culture	(2) Leverage	(3) ST1	(4) ST2	(5) ST3
$\widehat{Culture}$		−0.430***	0.235*	0.367**	0.483**
		(<.0001)	(0.08)	(0.04)	(0.03)
Size	−1.836***	4.844***	−5.824***	−11.295***	0.432
	(<.0001)	(<.0001)	(0.01)	(<.0001)	(0.86)
$Size^2$	0.109***	−0.296***	0.280***	0.564***	−0.122
	(<.0001)	(<.0001)	(0.01)	(<.0001)	(0.42)
MTB	0.242***	−1.970***	0.532	1.387**	0.996
	(<.0001)	(<.0001)	(0.43)	(0.03)	(0.15)
$\widehat{Leverage}$			−0.489**	−0.183	0.035
			(0.04)	(0.53)	(0.91)
ABN_Earn	−0.001	−0.001	0.005***	0.010***	0.009***
	(0.47)	(0.75)	(0.00)	(0.00)	(<.0001)
AssetMat	0.001	0.010***	−0.003	−0.006	−0.018
	(0.53)	(0.00)	(0.58)	(0.60)	(0.32)
Rating	−0.115	10.714***	1.289	−9.513 ***	−11.506***
	(0.20)	(<.0001)	(0.61)	(0.00)	(0.00)
INVG	−0.322***	−9.288***	−2.939	2.027	−3.796
	(0.00)	(<.0001)	(0.19)	(0.47)	(0.24)
Term	10.741***	−0.121	−11.993*	−15.815*	−12.865
	(<.0001)	(0.95)	(0.07)	(0.10)	(0.25)
Volatility	3.795***	37.362**	21.099**	10.975	9.318
	(<.0001)	(<.0001)	(0.04)	(0.39)	(0.50)
Culture3SIC	0.263***				
	(<.0001)				
Culture3ZIP	0.428***				
	(<.0001)				
Leverage	−1.124***				
	(<.0001)				
ITCI		−1.206***			
		(<.0001)			
TLCF		0.451**			
		(0.02)			
Fixed Assets		7.214***			
		(<.0001)			
Profitability		−5.621***			
		(<.0001)			
Year F.E.	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.953	0.794	0.300	0.566	0.765
N	12,491	12,491	12,491	12,491	12,491

This table shows the IV results. We test the relationship between *Culture* and the debt maturity structure of firms (*ST1*, *ST2*, *ST3*) using two instruments for *Culture*; i.e., the 3-digit SIC average of *Culture* and the 3-digit zip-code average of *Culture* (*Culture3SIC* and *Culture3ZIP*, respectively). In the calculation of the IVs, we exclude the one firm for which the instrument is being calculated. See Appendix for variable definitions. Numbers in parentheses are p-values, adjusted for heteroskedasticity and clustering at the firm level.***, **, and * denote significance at 1%, 5%, and 10%, respectively.

We empirically test the role of CEO Delta in mediating the relationship between corporate culture and debt maturity choice by using the model specified below:

$$ST1_{it+1}\ (ST3_{it+1}, ST5_{it+1}) = \alpha + \gamma_s + \tau_t + \beta_1 Delta_{it} + + \beta_2 Culture_{it} \times Delta_{it} + \beta_3 Delta_{it} + \theta X_{it} + \varepsilon_{it}. \quad (4)$$

In model (4), we augment the baseline model (model (2)) with the continuous variable for the sensitivity of CEO compensation to stock price (*Delta*) and the interaction term between corporate culture (*Culture*) and *Delta*. The *Delta* variable is constructed using the approach outlined by Core and Guay (2002) and Coles et al. (2006). In model (4), our coefficient of interest is β_2, capturing the moderating effect of CEO Delta in the relationship between corporate culture and the use of short-term debt. We use the same set of control variables and assumptions about standard errors as in the baseline model.

Our results for model (4) are presented in Table 7 and show a positive and significant coefficient for *Delta* regardless of which dependent variable is used to capture the short-term maturity of debt (i.e., ST1, ST3, and ST5). This implies that in firms where the CEO wealth is more sensible to stock price fluctuations, the use of short-term debt increases, thus reflecting a greater propensity from the management team to be monitored. This finding is consistent with Coles et al. (2006) who state that "*the sensitivity of CEO wealth to stock price, or delta, is seen as aligning the incentives of managers with the interests of shareholders. Higher delta can mean that managers will work harder or more effectively because managers share gains and losses with shareholders* ." A similar conclusion is reached by Belghitar and Clark (2015) who empirically show that the CEO Delta has a significant and negative effect on agency costs for firms in all size categories. Additionally, we show that the coefficient on the interaction term between *Delta* and *Culture* is negative and statistically significant either when we look at the fraction of corporate debt due within one year or when we look at the fraction of debt due within three or five years. This result suggests that (1) there exists a *substitution* effect between the disciplinary role of corporate culture and that of CEO delta, and (2) the relation between corporate culture and debt maturity dampens with increasing sensitivity of the CEO wealth to stock price movements. To summarize, our findings highlight that the effect of culture on capital structure choices may weaken in the presence of certain managerial compensation schemes.[16]

[16] For completeness, we have estimated model (4) by replacing the *Delta* variable with *Vega*, i.e., the sensitivity of CEO compensation to stock volatility.

Table 6
The role of stock ownership.

	(1) ST1	(2) ST3	(3) ST5
Culture	0.112	0.255**	0.382***
	(0.15)	(0.04)	(0.01)
StockOwn	0.053	−0.438	−0.498
	(0.87)	(0.28)	(0.22)
Culture*StockOwn	0.012	0.068**	0.062 **
	(0.60)	(0.02)	(0.03)
Size	−2.786	−12.427***	−6.228
	(0.23)	(0.00)	(0.11)
$Size^2$	0.141	0.649***	0.269
	(0.26)	(0.00)	(0.20)
MTB	−0.223	1.279**	1.713**
	(0.64)	(0.05)	(0.03)
$\widehat{Leverage}$	−0.498***	0.010	0.415
	(0.00)	(0.96)	(0.11)
ABN_Earn	0.808	0.777	0.828*
	(0.12)	(0.13)	(0.06)
AssetMat	−0.032	−0.101**	−0.250***
	(0.21)	(0.03)	(0.00)
Rating	0.251	−9.679***	−12.987***
	(0.86)	(<.0001)	(<.0001)
INVG	−2.813**	3.239*	−1.643
	(0.02)	(0.08)	(0.48)
Term	0.092	0.821***	−0.219
	(0.66)	(0.01)	(0.55)
Volatility	23.414***	33.070***	9.421
	(0.01)	(0.00)	(0.50)
Year F.E.	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes
Adjusted R^2	0.270	0.558	0.776
N	8602	8602	8602

This table reports results of the baseline regression model of debt maturity on corporate culture (*Culture*), the executive stock ownership (*StockOwn*), and their interaction. See Appendix for variable definitions. Each regression includes year and industry fixed effects. Numbers in parentheses are p-values, adjusted for heteroskedasticity and clustering at the firm level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Table 7
The role of CEO Delta.

	(1) ST1	(2) ST3	(3) ST5
Culture	0.104	0.247**	0.261*
	(0.16)	(0.04)	(0.08)
Delta	0.047*	0.080**	0.077**
	(0.06)	(0.04)	(0.04)
Culture*Delta	−0.002**	−0.004**	−0.004**
	(0.04)	(0.05)	(0.04)
Size	−4.232	−14.537***	−7.886*
	(0.14)	(<.0001)	(0.06)
$Size^2$	0.217	0.758***	0.344
	(0.16)	(0.00)	(0.14)
MTB	0.519	2.581***	2.072**
	(0.56)	(0.00)	(0.03)
$\widehat{Leverage}$	−0.285	0.376	0.494
	(0.32)	(0.23)	(0.19)
ABN_Earn	1.043**	1.360 ***	1.166***
	(0.04)	(0.01)	(0.01)
AssetMat	−0.028	−0.106***	−0.246***
	(0.31)	(0.01)	(0.00)
Rating	−1.684	−12.795***	−13.237***
	(0.48)	(<.0001)	(0.00)
INVG	−1.735	4.767**	−1.272
	(0.41)	(0.05)	(0.67)
Term	−8.132	−7.832	−4.514
	(0.24)	(0.43)	(0.69)
Volatility	8.905	−8.157	−1.630
	(0.57)	(0.64)	(0.93)
Year F.E.	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes
Adjusted R^2	0.273	0.561	0.776
N	8428	8428	8428

This table reports results of the baseline regression model of debt maturity on corporate culture (*Culture*), the sensitivity of CEO compensation to stock prices (*Delta*), and their interaction. See Appendix for variable definitions. Each regression includes year and industry fixed effects. Numbers in parentheses are p-values, adjusted for heteroskedasticity and clustering at the firm level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

7. Corporate culture, financial constraints, and debt maturity choice

Corporate culture is likely to play a pivotal role in shaping a firm's financial constraints. A strong and positive corporate culture fosters employee engagement, innovation, and productivity, factors that may all lead to better financial performance and increased access to capital markets. Companies with a culture that prioritizes transparency, integrity, ethical behavior, and accountability are also likely to attract investors and lenders more easily, lowering their financial constraints. Conversely, a dysfunctional culture can hinder performance, erode trust among stakeholders, and thus result in higher borrowing costs or difficulty in raising funds, exacerbating financial constraints. Therefore, cultivating a healthy corporate culture may directly impact a company's ability to navigate financial challenges.

We test the relationship between firm culture and firms' financial constraints using the following model[17]:

$$FinConstr_{it} = \alpha + \gamma_s + \tau_t + \beta_1 Culture_{it} + \theta X_{it} + \epsilon_{it}. \quad (5)$$

We measure firms' financial constraints using two different proxies. First, we use the measure developed by Hoberg and Maksimovic (2015), who look at firms with a machine-readable Capitalization and Liquidity Subsection of the MD&A section of the 10-K. We call this measure *FinConstr_HM*. Second, we use the financial constraint index by Linn and Weagley (2023), that further develops the Hoberg and Maksimovic (2015) measure by providing a more extensive firm-year coverage. We refer to this alternative proxy as *FinConstr_LW*. The interpretation for both measures is similar, i.e, higher values for these scores induce firms to delay their investments due to issues with liquidity and, consequently, plan to issue debt or equity to address these concerns.

Our results for model (5) are presented in Table 8. Our findings show that there exists a negative and significant relationship between corporate culture and firms' financial constraints, i.e, firms with a better culture are associated with lower financial constraints and a consequently better access to capital markets, regardless of which proxy is used to capture the financial hardship of corporations.

Having assessed the significant relationship between corporate culture and financial constraints, we now turn into investigating how financial constraints may affect the relationship between firms' cultural environment and their debt maturity structure. There is, in fact, a large consensus in the existing literature about the fact that firms' capital structure and investment decisions depend on their financial health, risk profile, as well as the state of the economy. Almeida et al. (2012) show that debt maturity choices can significantly constrain corporate investment in times of crisis, when access to financing opportunities is more limited. They show that firms whose long-term debt was largely maturing right after the third quarter of 2007 reduced investment significantly more than otherwise similar firms whose debt was scheduled to mature well after 2008. Poeschl (2023) investigates the link between firms' financial constraints and debt maturity structure choices and finds that firms shorten debt maturity during times when default risk

Our results (untabulated), show that there is no effect of any of our variables of interest (i.e., Culture, Vega, and their interaction) on the short-term maturity choice of debt.

[17] We thank an anonymous referee for suggesting to look at the *direct* relationship between firms' culture and their financial constraints.

Table 8
The role of corporate culture on firms' financial constraints.

	(1) FinConstr_HM	(2) FinConstr_LW
Culture	−0.0003**	−0.0048***
	(0.05)	(0.00)
Size	−0.0040***	−0.0602***
	(<.0001)	(<.0001)
Cash	−0.0601***	−1.0675***
	(<.0001)	(<.0001)
MTB	−0.0007	−0.0052
	(0.15)	(0.52)
Leverage	0.0003***	0.0070***
	(<.0001)	(<.0001)
Profitability	0.0157***	0.2252***
	(<.0001)	(<.0001)
Rating	0.0135***	0.1522***
	(<.0001)	(<.0001)
INVG	−0.0070***	−0.0982***
	(0.00)	(<.0001)
Term	−0.0147**	−0.2894
	(0.03)	(0.46)
Volatility	0.0164*	0.2645***
	(0.09)	(0.01)
Year F.E.	Yes	Yes
Industry F.E.	Yes	Yes
Adjusted R^2	0.276	0.176
N	9284	10,450

This table reports results of the baseline regression model of financial constraints on corporate culture (*Culture*). We use two different measures to capture firms' financial constraints; i.e., (1) Hoberg and Maksimovic (2015) and (2) Linn and Weagley (2023) (*FinConstr_HM* and *FinConstr_LW*, respectively). See Appendix for variable definitions. Each regression includes year and industry fixed effects. Numbers in parentheses are p-values, adjusted for heteroskedasticity and clustering at the firm level.***, **, and * denote significance at 1%, 5%, and 10%, respectively.

premiums are high, and their internal funds are scarce. Similarly, Datta et al. (2019) document that financially constrained firms will shorten their debt maturity structure, compared to their financial unconstrained counterparts, when policy uncertainty is high.

Given these findings, we expect the degree of firms' financial constraints to magnify the effect of corporate culture on debt maturity. We test the moderating role of financial constraints using the model specified below:

$$ST1_{it+1}\ (ST3_{it+1}, ST5_{it+1}) = \alpha + \gamma_s + \tau_t + \beta_1 FinConstr_{it} + \beta_2 Culture_{it} \times FinConstr_{it} + \beta_3 FinConstr_{it} + \theta X_{it} + \epsilon_{it}. \quad (6)$$

In model (6), we augment the baseline model (model (2)) with the continuous variables for financial constraints (either *FinConstr_HM* or *FinConstr_LW*) and the interaction term between the *Culture* and the financial constraint variables. In model (6), our coefficient of interest is β_2, capturing the moderating effect of firms' financial constraints on the relationship between corporate culture and the use of short-term debt. We use the same set of control variables and assumptions on standard errors as in the baseline Table 2.

Our results are presented in Table 9. Columns (1) to (3) (Columns (4) to (6)) report the analysis for the Hoberg and Maksimovic (2015) (Linn and Weagley, 2023) measure. Our analyses are comparable to the ones presented in the preceding section. We find that (1) financial constraints are negatively related to the firms' debt maturity suggesting that financially constrained firms tend to use long-term debt for their investment choices, (2) the effect of corporate culture is still positive and significant, and (3) the positive relationship between *Culture* and debt maturity structure choice is stronger for firms that are financially constrained, indicating that for firms with restricted access to capital markets, the role of culture in shaping capital structure choices is more pronounced.[18] For robustness, we also use the Kaplan and Zingales (1997) index (K-Z), the Whited and Wu (2006) index (W-W), and the Hadlock and Pierce (2010) index (H-P) to categorize firms as constrained and unconstrained and obtain similar results.[19]

8. Which dimensions of corporate culture matter?

As explained in Li et al. (2021), the *Culture* score we are using is a composite measure that incorporates five different dimensions, corresponding to the five most-often mentioned values by the S&P 500 firms on their corporate websites (Guiso et al., 2015): innovation (80% of the time), integrity (70%), quality (60%), respect (70%), and teamwork (50%). In this section, we provide a more detailed analysis of the effects of corporate culture on the use of short-term debt by firms by looking at all the five sub-components of *Culture*. Results for this analysis are presented in Table 10, panels A (for ST1), B (for ST2), and C (for ST3).[20]

Our results illustrate that not all the different cultural components are equally relevant for the firms' debt maturity choice. We note that the *Innovation* sub-component of *Culture* is the one that affects all our dependent variables, i.e., ST1, ST3, and ST5. Further, we observe that *Teamwork* positively and significantly affects the fraction of debt maturing in one and three years, while *Quality* is an important determinant for the fraction of debt due in three and five years. Finally, we observe that the fraction of debt due within three years is positively affected by the *Integrity* values. Taken together, our results suggest that, while the composite *Culture* score plays a crucial role on the debt maturity structure of firms, each component of this measure has a different effect on the corporate debt maturing in one, three, and five years.

9. Does corporate culture affect credit ratings?

Another dimension of corporate debt is credit ratings. The net effect of corporate culture on credit ratings remains unexamined. In this section, we investigate whether decisions in firms with superior culture influence corporate credit ratings. Consistent with the survey findings in Graham et al. (2022), Li et al. (2021) find a positive association between firms with a strong culture and their operational efficiency as measured by assets turnover and inventory turnover. Further, they show that corporate culture reduces discretionary accruals, promotes the long-term orientation, and is positively associated with the firm value, as proxied by the Tobin's q. These findings prompt us to expect that firms with stronger culture should also be associated with higher credit ratings. However, on the other hand, short-term debt is also exposed to rollover risk that may induce credit rating agencies to assign lower ratings to these firms.

We examine the relationship between corporate culture and firms' credit ratings using the propensity score matching approach that we detailed earlier. First, we estimate the probability that a firm is categorized as having *High_CultureQ4* (i.e., top quartile of the *Culture* score) controlling for firm-specific characteristics, industry, and year fixed effects. Then, we look for firm-year units that are not treated (i.e., not

[18] We have also performed an additional test that looks at the impact of the 2008–2009 financial crisis on the relationship between corporate culture and debt maturity structure. While we find that the positive relationship between *Culture* and shorter debt maturities continues to hold, we also find that periods of financial crises have *no* impact on the aforementioned relationship. Further, consistent with prior literature (see, e.g., González, 2015), we show that firms experiencing a crisis are likely to choose shorter debt maturities.

[19] For brevity, we do not present these results but they are available upon request.

[20] There are strong positive correlations among all five values, so we present the effect of each cultural sub-component taken alone.

Table 9
The role of financial constraints.

	(1) ST1	(2) ST3	(3) ST5	(4) ST1	(5) ST3	(6) ST5
Culture	0.089	0.202*	0.327***	0.107	0.376***	0.406***
	(0.28)	(0.09)	(0.01)	(0.13)	(0.00)	(<.0001)
FinConstr_HM	−0.909	−5.658	−4.547			
	(0.72)	(0.13)	(0.26)			
Culture*FinConstr_HM	0.053	0.604**	0.700**			
	(0.80)	(0.04)	(0.02)			
FinConstr_LW				−1.627	−2.793	−4.400**
				(0.18)	(0.12)	(0.02)
Culture*FinConstr_LW				0.167**	0.211*	0.273**
				(0.05)	(0.09)	(0.03)
Size	−6.164***	−12.606***	−3.443	−5.688***	−10.828 ***	0.066
	(0.00)	(<.0001)	(0.19)	(0.00)	(<.0001)	(0.97)
$Size^2$	0.285***	0.629***	0.117	0.278***	0.536 ***	−0.103
	(0.01)	(<.0001)	(0.48)	(0.00)	(<.0001)	(0.38)
MTB	0.341	1.568***	1.873***	0.623	1.594***	1.260 **
	(0.58)	(0.01)	(0.00)	(0.24)	(0.01)	(0.02)
$\widehat{Leverage}$	−0.595***	−0.132	0.470*	−0.367*	−0.044	0.247
	(0.00)	(0.61)	(0.07)	(0.09)	(0.87)	(0.34)
ABN_Earn	0.013***	0.777	0.007***	0.005***	0.010***	0.009***
	(0.00)	(<.0001)	(0.00)	(0.00)	(0.00)	(<.0001)
AssetMat	−0.002	−0.006	−0.022	−0.006	−0.008	−0.018
	(0.73)	(0.63)	(0.24)	(0.33)	(0.49)	(0.26)
Rating	2.648	−10.039***	−14.886***	−0.460	−11.230***	−14.254***
	(0.24)	(0.00)	(<.0001)	(0.85)	(0.00)	(<.0001)
INVG	−3.575*	3.409	−0.342	−1.764	3.208	−2.591
	(0.06)	(0.19)	(0.90)	(0.36)	(0.18)	(0.28)
Term	0.182	0.757**	−0.379	−11.207	−16.576	−13.403
	(0.41)	(0.02)	(0.30)	(0.11)	(0.20)	(0.42)
Volatility	29.615***	28.448***	0.405	17.865*	3.708	−2.342
	(0.00)	(0.01)	(0.97)	(0.06)	(0.76)	(0.84)
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.305	0.565	0.760	0.298	0.565	0.765
N	9284	9284	9284	10,450	10,450	10,450

This table reports results of the baseline regression model of debt maturity on corporate culture (*Culture*), the firms' financial constraints (*FinConstr*), and their interaction. We use two measures to capture the firms' financial constraints; i.e., (1) Hoberg and Maksimovic (2015) and (2) Linn and Weagley (2023) (*FinConstr_HM* and *FinConstr_LW*, respectively). See Appendix for variable definitions. Each regression includes year and industry fixed effects. Numbers in parentheses are p-values, adjusted for heteroskedasticity and clustering at the firm level.***, **, and * denote significance at 1%, 5%, and 10%, respectively.

classified as having high culture, meaning with a Culture score in the bottom quartile) and estimate the model specified as follows:

$$CR_{it}\ (CR_{it+1}) = \alpha + \gamma_s + \tau_t + \beta_1 Culture_{it} + \theta X_{it} + \varepsilon_{it}, \quad (7)$$

where *CR* identifies the credit rating for firm *i* at time *t*.

To construct the firm's credit rating, *CR*, we collect Standard and Poor's Domestic Long-Term Issuer Credit Rating from Compustat Ratings. Following prior literature, (e.g., Klock et al., 2005; Jiraporn et al., 2014, among others), credit ratings are converted to a numerical scale were AAA-rated firms are assigned a value of 1, while D-rated firms are assigned a value of 22. We control for firm-specific characteristics, such as firm size, cash-to-assets ratio, market to book, leverage, abnormal earnings, fixed-to-total assets ratio, dividend payout ratio, and the volatility of monthly stock returns.[21] As in the baseline regression model, we include year and industry fixed effects and cluster the standard errors at the firm level.

The results are presented in Table 11. Column (1) shows results when corporate credit ratings at evaluated at time *t*, while column (2) reports estimates for credit ratings at time *t+1*. Our findings show that firms with a stronger cultural environment benefit from higher ratings, regardless of whether we look at contemporaneous or future credit ratings.[22] We also find that firms with greater stock market volatility, growth opportunities, and liquidity have lower ratings, while larger firms, more profitable firms, and those that payout more dividends are associated with higher ratings.[23] Taken together, this analysis further reinforces the idea that firms with superior corporate cultural environment translates into higher credit ratings.[24]

10. Conclusions

This study establishes a link between corporate culture and firms' debt maturity choice. Specifically, we document a significant positive relation between superior corporate culture and the choice of shorter-term debt. We use the composite measure of corporate culture constructed by Li et al. (2020), summarizing the five most cited values by S&P500 firms on their website, namely innovation, integrity, quality, respect, and teamwork. Employing a two-stage least squares regression model to account for the simultaneous choice of leverage and debt maturity, we document that firms with stronger corporate culture choose shorter debt maturity compared to those with weaker cultural environments. The results are both statistically and economically significant, indicating that a one standard deviation increase in the culture

[21] These firm-specific characteristics are the same that we use to match treated and untreated firm-year observations.

[22] These results are consistent with our results from Table 7 showing that firms with a better culture have weaker financial constraints relative to firms with a more deteriorated cultural environment.

[23] In untabulated results, we also test the baseline model (as reported in Table 2) by controlling for the corporate credit rating and find that the positive and significant effect of corporate culture on debt maturity is robust.

[24] If credit ratings are generally higher for firms with more developed cultural values, we also find that these values do not trigger any credit rating change, upgrades and downgrades, meaning that firms with stronger culture appear to be more stable.

Table 10
Components of culture value.

Panel A: ST1					
	(1)	(2)	(3)	(4)	(5)
Integrity	0.089				
	(0.70)				
Teamwork		0.651***			
		(0.01)			
Respect			−0.139		
			(0.46)		
Quality				0.270	
				(0.32)	
Innovation					0.297**
					(0.05)
Firm controls	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.294	0.296	0.294	0.295	0.295
N	12,491	12,491	12,491	12,491	12,491

Panel B: ST3					
	(1)	(2)	(3)	(4)	(5)
Integrity	0.676**				
	(0.05)				
Teamwork		0.660*			
		(0.07)			
Respect			0.263		
			(0.36)		
Quality				0.778**	
				(0.04)	
Innovation					0.730***
					(0.00)
Firm controls	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.566	0.566	0.565	0.566	0.566
N	12,491	12,491	12,491	12,491	12,491

Panel C: ST5					
	(1)	(2)	(3)	(4)	(5)
Integrity	0.539				
	(0.15)				
Teamwork		0.598			
		(0.14)			
Respect			0.425		
			(0.18)		
Quality				0.739*	
				(0.09)	
Innovation					0.589**
					(0.02)
Firm controls	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes
Industry F.E.	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.765	0.765	0.765	0.765	0.765
N	12,491	12,491	12,491	12,491	12,491

This table shows the relationship between each of the *Culture* components (*Integrity*, *Teamwork*, *Respect*, *Quality*, and *Innovation*) and the debt maturity structure of firms. Panel A reports results for ST1. Panel B shows results for ST3, and Panel C for ST5. In each of the regression models, we include a set of control variables affecting the debt maturity structure of firms (*Size*, $Size^2$, *MTB*, *ABN_Earn*, *AssetMat*, *Rating*, *INVG*, *Term*, and *Volatility*). Years and industry fixed effects are included. See Appendix for variable definitions. Numbers in parentheses are p-values, adjusted for heteroskedasticity and clustering at the firm level.***, **, and * denote significance at 1%, 5%, and 10%, respectively

variable is associated with a 6.65% increase in the use of short-term debt due in one year, a 5.26% increase in the fraction of short-term debt due in three years, and a 2.72% increase in debt maturing in five years. These findings suggest that managers in firms with superior culture are less likely to engage in opportunistic behaviors and more likely to accept external monitoring through the choice of shorter-term debt.

Table 11
Culture and credit ratings.

	(1) CR(t)	(2) CR(t+1)
Culture	−0.049***	−0.048***
	(0.00)	(0.00)
Size	−2.106***	−2.094***
	(<.0001)	(<.0001)
Cash/Assets	3.095***	3.313***
	(<.0001)	(<.0001)
MTB	0.348***	0.322***
	(<.0001)	(<.0001)
Leverage	−0.010	−0.011
	(0.21)	(0.13)
ABN_Earn	−0.002***	−0.001***
	(<.0001)	(<.0001)
Fixed assets	0.823	1.124
	(0.27)	(0.13)
Dividends	−0.117***	−0.099***
	(<.0001)	(<.0001)
Volatility	1.848**	3.671***
	(0.04)	(<.0001)
Year F.E.	Yes	Yes
Industry F.E.	Yes	Yes
Adjusted R^2	0.959	0.960
N	6222	5858

This table shows propensity score matching regression results studying the relationship between corporate culture (*Culture*) and credit ratings (*CR*). Columns (1) (2) reports results when all variables are defined at time *t* (*t+1*). In all the regressions, we control for firm-specific characteristics that are likely to affect the credit rating levels of firms (*Size*, *Cash to Assets*, *Leverage*, *MTB*, *ABN_Earn*, *Fixed Assets*, *Dividends*, and *Volatility*). We include industry, and year fixed effects. See Appendix for variable definitions. Numbers in parentheses are p-values, adjusted for heteroskedasticity and clustering at the firm level. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

To validate the results, we perform a battery of robustness tests, including controlling for firm investment in socially responsible activities (CSR) and the social capital in the county where the firm is headquartered, as well as including macro- and executive-specific controls, and alternative definitions for firm culture. We attempt to reduce the endogeneity concerns by using propensity score matching and an instrumental variables approach. The positive and significant effect of corporate culture on short-term debt is found to hold regardless of how endogeneity is addressed.

In addition, we investigate which of the five dimensions of culture have meaningful influence on the debt maturity structure choice. The subcomponents of integrity, teamwork, and innovation are found to play a discernible role in this decision. Our analysis also reveals that the relation between culture and debt maturity is more pronounced in firms with higher managerial stock ownership, and in financially constrained firms, but weaker in firms where the CEO compensation is more sensitive to stock price fluctuations. Finally, we investigate the role of culture on corporate long-term credit ratings and find that firms with superior culture have higher ratings.

CRediT authorship contribution statement

Sudip Datta: Writing – review & editing, Writing – original draft, Conceptualization. **Trang Doan:** Formal analysis. **Francesca Toscano:** Supervision, Methodology.

Data availability

Data will be made available on request.

Appendix. Definitions of variables

This section provides the variable definitions used in the analysis. Compustat item codes, when available, are provided in parentheses.

ABN_Earn: (Earnings in year *t+1* (data item 20) - earnings in year *t*)/(share price (data item 199) × outstanding shares (data item 54)) in year *t*).

AssetMat: (Gross property, plant, and equipment (data item 7)/total assets (data item 6)) × (gross property, plant, and equipment (data item 7)/depreciation expense (data item 14)) + (current assets (data item 4)/total assets (data item 6)) × (current assets (data item 4)/cost of goods sold (data item 41)).

Cash/Assets: Ratio of cash and short-term investments (CHE) to total assets (AT).

CR: Numerical score for corporate credit ratings were AAA-rated firms are assigned a value of 1, while D-rated firms are assigned a value of 22.

CSR Score: To construct this measure we rely on the CSR ratings available in the 2019 MSCI ESG KLD Stats database which catalogs firm activities into 13 different categories. We define the firm-specific total CSR score using only five categories related to community, environment, employees, diversity, and human rights (as in Servaes and Tamayo, 2013, among the others). For each of the five categories used to calculate the total CSR score, data is compiled annually about the strengths and weaknesses using a binary measure. Because the maximum numbers of strengths and weaknesses can change annually, we normalize the number of strengths (weaknesses) in a year by the maximum number of strengths (weaknesses) in that year. Therefore, the normalized value for strength (weakness) ranges between zero and one for each of the five categories by construction. Next, for each firm-year, we compute the CSR score for each of the five categories by subtracting the normalized value of weaknesses from the normalized value of strengths for that category. Finally, we add the CSR scores across the five categories to get the firm-level CSR measure.

Culture: Obtained from Li et al. (2021). It is a composite measure that summarizes corporate values such as Innovation, Integrity, Quality, Respect, and Teamwork.

Culture3SIC: 3-digit zip code average of Culture, minus the firm for which the instrument is being calculated.

Culture3ZIP: 3-digit SIC industry average of Culture, minus the firm for which the instrument is being calculated.

Delta: Sensitivity of CEO compensation to stock prices, as provided by Coles et al. (2006) and available at https://sites.temple.edu/lnaveen/data/

Dividends: Equal to one if the firm pays dividends (DVC).

Female: Equal to one if the firm has a female CEO or a female CFO, and zero otherwise.

Fixed Assets: Ratio of net property, plant, and equipment (PPENT) to total assets (AT).

FinConstr: Either the Hoberg and Maksimovic (2015) index (FinConstr_HM) or the Linn and Weagley (2023) measure (FinConstr_LW). A higher value of *FinConstr* means that firms are delaying their investments due to issues with liquidity and, consequently, plan to issue debt or equity to solve the liquidity issue.

GDP growth: The growth in gross domestic product.

High_Culture: Equal to one for above-median *Culture*scores.

High_CultureQ4: Equal to one if the *Culture* score is in the top quartile of its distribution.

INVG: Equal to one if a firm's credit rating is BBB- or higher by Standard & Poor's, and zero otherwise.

ITC: Equal to one for firms with investment tax credits, and 0 otherwise.

Leverage: Long-term debt (data item 9)/market value of total assets × 100.

Macro Uncertainty: Measure of the level of macroeconomic uncertainty, which is three-month ahead macroeconomic uncertainty obtained from Jurado's website.

MTB: Market value of total assets/book value of total assets. We measure the market value of total assets with *Size*.

Profitability: The ratio of operating income before depreciation (data item 13) to total assets (data item 6).

Rating: Equal to one for rated firms, and zero for non-rated firms.

Recession dummy: Equal to one if there are at least 1 month in a year designated as recession by the NBER.

REG: Equal to one for regulated firms, and zero for non-regulated firms.

Short-term rate: Yield on 1-year government bonds (Federal Reserve).

Size: The share price (data item 199) × outstanding shares (data item 54) + book value of total assets (data item 6) − book value of equity (data item 60).

Social cap: The measure is constructed using the approach from Rupasingha and Goetz (2008). As in their study, we use two measures of norms and two measures of networks. The two measures of norms are the census mail response rate and the votes cast in presidential elections. The two measures of networks are the associations number and nonprofit organizations each per 10,000 people. Using these four indicators, we conduct a principal component analysis for the years 1990, 1997, 2005, and 2009. We use the first component for each year and linearly interpolate the data to fill in the missing years.

ST1: Percentage of debt maturing in one year or less divided by total debt.

ST3: Percentage of debt maturing in three years or less divided by total debt.

ST5: Percentage of debt maturing in five years or less divided by total debt.

StockOwn: Number of shares (excluding options) owned by both the CEO and CFO divided by common shares outstanding at the end of the fiscal year.

Taxes: Ratio of total income taxes (TXT) to pretax income (PI).

Term: The difference between the month-end yield on 10-year government bonds and the month-end yield on 6-month treasury constant maturity date.

TLCF: Equal to 1 for firms with operating loss carryforwards, and 0 otherwise.

Volatility: The standard deviation of the natural logarithm of stock return during the fiscal year [standard deviation of (ln(return)) × (market value of equity/market value of assets)].

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