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Language structure and corporate financing: The role of future time reference

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ABSTRACT

This paper investigates how linguistic structures, specifically the strength of future time reference (FTR) in languages, affect corporate financing decisions. Using a panel of firms from 48 countries over the period 1981—2019, we show that firms in `strong-FTR` language environments are more likely to rely on debt financing and tend to issue debt with longer maturities than those in `weak-FTR` countries. These results are robust to a range of controls and falsification tests. We further demonstrate that `FTR-strength` moderates firms' financing responses to major institutional and macroeconomic shifts, including the Global Financial Crisis, the adoption of International Financial Reporting Standards (IFRS), and mandatory corporate board reforms. Finally, we find that `FTR-strength` influences the relationship between financing choices and firm value. Overall, our findings position `FTR-strength` as a salient distinct informal institutional factor that shapes corporate financial behavior beyond traditional economic and legal determinants.

1. Introduction

The Sapir-Whorf hypothesis, also known as the linguistic relativity principle (Whorf, 1956), posits that language shapes thought processes and behavior. This theoretical framework has gained traction in economic research, particularly through the lens of Future-Time Reference (FTR) strength, which captures how languages grammatically distinguish between present and future events. Recent studies suggest that cross-linguistic variation in `FTR-strength` is associated with differences in corporate decisions and outcomes across countries.[1] More recently, scholars have highlighted the role of `FTR-strength` in shaping firms' strategic orientations (Liang et al., 2018), which are tightly linked to corporate financing decisions (see Antonczyk et al., 2014; Haq et al., 2018; Kadzima et al., 2024; Mogha & Williams, 2021). However, despite growing interest in linguistic influences on economic behavior, the specific relationship between language and corporate financing choices remains largely unexplored. This study seeks to address that gap by answering the following key research question: How does Future-Time Reference (FTR) in languages influence corporate financing decisions? Exploring this question contributes to the nascent literature on the intersection between language and corporate finance by addressing an important but overlooked dimension of informal institutions.

Linguistic research suggests that language influences speakers' temporal orientation. `Strong-FTR` languages—such as English, Greek, Russian, French, and Spanish—grammatically mark a clear distinction between the present and the future, thereby fostering a perception of the future as distant and less immediate (see Dahl, 2000; Thieroff, 2000). As a result, managers embedded in `strong-FTR` linguistic environments are more likely to adopt short-term perspectives and exhibit myopic decision-making (Doney et al., 1998). This temporal bias may lead to a preference for debt, particularly long-term debt, due to a perceived temporal distance from the associated risks. By heavily discounting future obligations (Kim et al., 2020), such managers may underestimate the costs and risks of debt financing. Furthermore, they may find equity financing less attractive due to its heightened agency costs, especially when managerial incentives are skewed toward short-term performance. In parallel, investors in `strong-FTR` contexts tend to favor debt instruments—especially those with shorter maturities—as tools to constrain managerial short-termism (Doney et al., 1998).

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[1] Examples of corporate decisions influenced by `FTR-strength` include investment efficiency (Kim et al., 2020), savings (Chen et al., 2017), R&D or innovation (Kong et al., 2022; Machokoto et al., 2025), corporate default risk (Ho, 2024), IPO underpricing (Zhang et al., 2023), tax avoidance (Cheng et al., 2021; Na & Yan, 2022), corporate social responsibility and research and development (Chi et al., 2020; Liang et al., 2018), earnings management (Kim et al., 2017), risk-taking (Osei-Tutu & Weill, 2021), stock price crash risk (Ho, 2024), and dividend payments (He & Zhang, 2022; Nishikawa et al., 2023).

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Conversely, speakers of weak-FTR languages—such as German, Mandarin, Japanese, and Scandinavian languages—tend to exhibit greater risk aversion (Osei-Tutu & Weill, 2021) and a stronger long-term orientation (Hechavarría et al., 2023). These linguistic characteristics might encourage a cognitive framework that places more emphasis on the future—long-term planning, caution, and delayed gratification, all of which shape the way managers perceive financial risk and returns over time. As a result, managers in weak-FTR language contexts are more likely to avoid excessive borrowing, particularly long-term debt, due to heightened sensitivity to potential future obligations and risks. Instead, they are more inclined to rely on equity financing, which aligns with their long-term strategic outlook and mitigates the intertemporal agency problems associated with debt. Investors in weak-FTR contexts, sharing similar long-term or future orientations, are also more receptive to equity-based instruments, which allow firms greater flexibility and reduce the need for frequent refinancing or interest payments. Moreover, the emphasis on prudence and sustainability in weak-FTR contexts discourages short-termism and promotes capital structures that support long-run value creation. Such linguistic differences give rise to a fundamental yet underexplored question: To what extent does language-induced temporal orientation shape corporate debt-financing behavior?

To investigate this, we employ a comprehensive empirical approach using an extensive international firm-level dataset comprising 512,046 firm-year observations from 40,655 firms across 48 countries over the period 1981—2019. We find that firms in strong-FTR countries exhibit higher leverage and longer debt maturities. These effects are economically meaningful: relative to the sample average, firms in strong-FTR countries use approximately 11.56% more leverage and 27.16% longer debt maturities. These findings are consistent with the idea that managers in strong-FTR countries, predisposed to borrowing against future income, are more debt-reliant. They also align with the notion that investors in these contexts prefer debt instruments to monitor managerial behavior (see Osei-Tutu & Weill, 2021). Further, the results suggest that managers in strong-FTR settings perceive long-term debt obligations as temporally distant and apply higher discount rates, thereby favoring longer maturity structures (see Kim et al., 2020). Our findings remain robust across various specifications, including controls for firm- and country-level covariates, fixed effects, and alternative estimation strategies. We also conduct falsification tests to ensure that our findings do not stem from spurious correlations.

To further address endogeneity concerns and disentangle the influence of FTR-strength from other country-specific factors, we utilize a quasi-natural experiment: the 1997 handover of Hong Kong from the United Kingdom to China—a rare shift from a strong-FTR (English) to a weak-FTR (Mandarin) linguistic environment. We also conduct within-country analyses using data from Switzerland, a multilingual country where both strong-FTR and weak-FTR languages are spoken. These analyses mitigate concerns that cross-country differences may confound our results. Additionally, we perform numerous robustness checks, including alternative samples, model specifications, variable definitions, and estimation methods. The results consistently affirm the central role of language as an informal institution influencing corporate debt financing decisions beyond the reach of formal institutional and macroeconomic factors.

To deepen our analysis, we implement three difference-in-difference (DiD) frameworks centered on major global events and policy changes: the Global Financial Crisis, IFRS adoption, and mandatory board reforms. In the first DiD analysis, we hypothesize that the financial crisis would generally raise leverage and shorten debt maturities due to increased uncertainty, with more pronounced effects in strong-FTR countries, where investors more actively monitor for managerial myopia. Our findings confirm this expectation: firms in strong-FTR countries experienced a sharper increase in leverage and a more pronounced decline in debt maturity following the crisis. In the second DiD analysis, centered on IFRS adoption, we find that the short-term orientation of managers in strong-FTR countries amplified the post-adoption rise in leverage and decline in debt maturity. In the third DiD setting, we examine the effects of mandatory board reforms—which are intended to reduce the monitoring role of debt (see Ben-Nasr et al., 2021). We find that while both leverage and debt maturity generally decline following these reforms, the effects are attenuated in strong-FTR countries, again highlighting the moderating influence of language-induced temporal orientation. Collectively, these DiD analyses offer important insights into how language interacts with corporate governance, financial reporting reforms, and macroeconomic shocks.

Finally, we examine whether FTR-strength moderates the relationship between financing decisions and firm value. Specifically, we assess how language influences the well-documented agency conflict between shareholders and bondholders associated with debt financing (Myers & Majluf, 1984). Our results reveal a more negative association between leverage and debt maturity and both short-run and long-run firm value in strong-FTR countries. These findings are robust to a wide range of controls, including formal institutions (legal, political, and economic), national culture (e.g., power distance, masculinity, uncertainty avoidance), dominant religion (e.g., Catholicism, Protestantism, Islam), and macroeconomic conditions (e.g., GDP growth, inflation). These results underscore the influential role of language in shaping corporate financial behavior and firm valuation.

This study contributes to the literature in several important ways. First, while prior research has explored the effects of FTR-strength on various corporate behaviors, this study is the first, to the best of our knowledge, to demonstrate that language operates as a distinct informal institution that influences corporate financing decisions independently of formal institutional frameworks (see Boubakri et al., 2017; Guiso et al., 2016; Machokoto, Chipeta et al., 2021; Na & Yan, 2022; Osei-Tutu & Weill, 2021; Oztekin & Flannery, 2012). Second, we contribute to the ongoing debate on the contextual determinants of accounting reform effectiveness by showing that linguistic temporal orientation conditions corporate responses to both IFRS adoption and the Global Financial Crisis (see Ahmed et al., 2013; Boubakri et al., 2017; Daske et al., 2008; Duchin et al., 2010; Iqbal & Kume, 2014; Machokoto, Areneke and Nyangara, 2020). Third, we extend the literature on board reforms by demonstrating that the future orientation embedded in languages moderates their impact on firms' financing choices (Ben-Nasr et al., 2021). Fourth, while prior studies emphasize the role of formal institutional quality in shaping the financial consequences of economic crises (Demirgüç-Kunt et al., 2020; van Essen et al., 2013), we provide novel evidence that informal institutions—specifically linguistic temporal orientation—are equally consequential. Finally, this study is the first, to the best of our knowledge, to show that the relationship between debt financing and shareholder value is contingent on FTR-strength, offering a fresh explanation for the mixed findings in the existing literature.[2]

The remainder of this paper is structured as follows. Section 2 reviews the relevant literature and develops our hypotheses. Section 3 outlines the data and methodology. Section 4 presents and discusses the empirical results. Section 5 concludes the paper.

2. Background literature and hypotheses development

2.1. Prior studies

The linguistic relativity principle, commonly referred to as the Sapir-Whorf hypothesis (Whorf, 1956), posits that languages significantly shape individuals' cognitive processes and behavior. A growing body of research underscores the role of language as a powerful informal institution influencing economic decision-making, even in an era characterized by rapid technological and informational advances.

[2] See, for example, Chava and Roberts (2008), Modigliani and Miller (1958), Myers (1977), and Stein (2003).

Recent scholarship has increasingly focused on how the temporal orientation of languages—specifically, the strength of Future Time Reference (FTR-strength)—affects corporate behavior. For example, Chen et al. (2017) used precautionary cash holdings as a proxy for corporate behavior and found that firms in strong-FTR countries exhibit lower savings or cash reserves. Similarly, Kim et al. (2017) examined the impact of FTR-strength on financial reporting, showing that both accrual and real earnings management are more prevalent among firms in strong-FTR countries. In contrast, Cao et al. (2023) documented a greater tendency toward earnings smoothing in firms from weak-FTR countries.

Languages' temporal structure has also been linked to corporate risk-taking, particularly within the banking sector. Osei-Tutu and Weill (2021) found that the grammatical separation between present and future in strong-FTR languages alters perceptions of temporal distance, thereby reducing the perceived risks associated with lending. Reinforcing this, Kim et al. (2020) showed that underinvestment is less prevalent among firms in weak-FTR countries. Meanwhile, Kong et al. (2022) provided empirical evidence that globalization mitigates the inverse relationship between FTR-strength and innovation. Other studies, such as Chi et al. (2020) and Tang et al. (2021), also link FTR-strength to innovation, with the former associating it with new business creation and the latter finding that weak-FTR languages are positively related to corporate R&D intensity. Liang et al. (2018) further explored the effects of languages on future corporate orientation, using corporate social responsibility and R&D expenditures as proxies. They found that firms in strong-FTR countries are less engaged in future-oriented activities, although this effect diminishes in multilingual environments.

The literature also highlights the influence of FTR-strength on corporate financial policies. Firms in strong-FTR countries tend to have higher dividend payouts than their counterparts in weak-FTR countries (He & Zhang, 2022; Nishikawa et al., 2023). He and Zhang (2022) also found that strong-FTR languages are associated with a higher implied cost of equity capital and weaker market reactions to dividend changes. Despite this growing interest, however, no study has systematically examined the effect of FTR-strength on corporate financing behavior. This study addresses that gap by investigating how linguistic differences in temporal encoding influence firms' financing decisions.

2.2. Time encoding in languages and corporate (debt) financing decisions

Research on FTR suggests that speakers of strong-FTR languages perceive the future as more distant and, as a result, exhibit weaker future-oriented concerns (Chen, 2013; Dahl, 2000; Thieroff, 2000). Consequently, they tend to adopt more short-term orientations, while speakers of weak-FTR languages are generally more long-term oriented (Chen, 2013; Hechavarría et al., 2023). This distinction has meaningful implications for both demand-side and supply-side determinants of corporate financing behavior.

On the demand side, managers who speak strong-FTR languages may be more prone to myopic behavior (Doney et al., 1998) and risk-taking (Osei-Tutu & Weill, 2021), potentially underestimating the risks associated with borrowing. Additionally, the short-term orientation common in strong-FTR countries suggests higher agency costs, which can render equity financing less attractive. Given that debt is often less costly in contexts characterized by greater agency conflicts (Myers & Majluf, 1984), firms in strong-FTR countries are likely to favor debt over equity. Supporting this, Haq et al. (2018) and Mogha and Williams (2021) argue that managers in strong-FTR countries are more focused on short-term expenditures, even if it means borrowing against future income. Accordingly, we expect firms in strong-FTR countries to exhibit higher leverage than those in weak-FTR countries.

On the supply side, the short-term outlook and risk-taking behaviors associated with strong-FTR speakers pose monitoring challenges for financiers, who may prefer debt over equity as a disciplinary mechanism (Hart, 1995). Kadzima et al. (2024) provides evidence consistent with the demand-side perspective: firms in strong-FTR countries, which are more risk-tolerant, are less likely to adopt negative net debt and more willing to incur borrowing risk. Drawing on both supply-side and demand-side considerations, we propose the following hypothesis:

Hypothesis 1. FTR-strength is positively associated with debt financing.

Existing literature also suggests that FTR-strength may influence corporate decisions regarding debt maturity. However, theoretical predictions on this relationship are mixed. On the supply side, prior evidence suggests that FTR-strength may be negatively associated with debt maturity. Lenders often prefer short-term debt as a way to mitigate agency conflicts between shareholders and creditors (see Della Seta et al., 2020; Kahn & Calomiris, 1991; Leland & Toft, 1996), particularly in environments where borrowers exhibit short-termism, myopia, or heightened risk-taking behaviors (Chen, 2013; Doney et al., 1998; Osei-Tutu & Weill, 2021). Under such conditions, lenders may be more inclined to offer short-term debt.

Conversely, demand-side arguments suggest that managers in strong-FTR countries may perceive long-term debt as temporally distant and discount its future burden more heavily (Kim et al., 2020). This perception may lead them to favor long-term borrowing, underestimating the risks it entails. Supporting this interpretation, Kong et al. (2022) shows that firms in strong-FTR countries are less likely to innovate due to their lower valuation of long-term benefits. Likewise, the findings by Kadzima et al. (2024), previously discussed, align with this demand-side perspective. Given the contrasting theoretical predictions from supply-side and demand-side viewpoints, we propose the following hypothesis, which we test empirically:

Hypothesis 2. FTR-strength is positively (negatively) associated with corporate debt maturity.

3. Methodology and data

3.1. Methodology

We empirically investigate the relationship between the future time reference (FTR) embedded in national languages and corporate debt financing behavior using the following baseline specification:

$$y_{ijkt} = \gamma_0 + \gamma_1 \text{strong-FTR}_k + \boldsymbol{\theta} \boldsymbol{Z}_{ijkt-1} + \eta_j + \eta_t + \xi_{ijkt} \quad (1)$$

where i, j, k, and t are the indices for firm, industry, country, and year, respectively. y is leverage (total debt to total assets, TDA) or debt maturity structure (long-term debt to total debt, LDTD, γ_0 is a constant. γ_1 and $\boldsymbol{\theta}$ are coefficients to be estimated. We draw on several prior studies (Chen et al., 2017; Kim et al., 2017; Liang et al., 2018; Osei-Tutu & Weill, 2021) and define strong-FTR as a dummy variable set to one for firms in strong-FTR countries and zero otherwise. $\boldsymbol{Z}_{ijkt}$ is a vector of determinants of corporate financing decisions from the literature (see Aggarwal & Goodell, 2014; Bedendo et al., 2020; Demirgüç-Kunt & Maksimovic, 1999; Giannetti, 2003; Rajan & Zingales, 1995). These include lagged Tobin's q, sales growth (Sales Growth), return on assets (ROA), firm-size (Size), tangibility (Tangibility), depreciation (ΔDEP), research and development (R&D), legal institutions (Legal Institutions), political institutions (Political Institutions), economic institutions (Economic Institutions), power distance (Power Distance), masculinity (Masculinity), uncertainty avoidance (Uncertainty Avoidance), catholic (Catholic), GDP growth (GDP growth) and

inflation (Inflation). η_j, η_k and η_t are industry, country and year-fixed effects, respectively. Finally, ξ_{ijkt} denotes the error term.

A methodological limitation arises from the fact that strong-FTR is a time-invariant country-level variable. Consequently, we could not include country-fixed effects in our main regression models, as this would fully absorb the variation in our key explanatory variable. To mitigate potential omitted variable bias from unobserved country-specific heterogeneity, we address this issue in several ways. First, we saturate our models with a rich set of time-varying country-level controls. Second, we perform extensive robustness checks, including difference-in-differences estimations that exploit variation over time in language use and sample composition. Third, we conduct falsification tests to ensure that our findings are not driven by spurious correlations or mechanical relationships. A comprehensive description of all variables is provided in Appendix A.

3.2. Data

We construct our firm-level dataset using data sourced from Thompson Reuters Datastream. This widely utilized financial and economic database provides comprehensive, standardized, and high-frequency firm-level information across a broad range of countries. Thompson Reuters Datastream is particularly well-suited for our cross-country analysis as it ensures consistency in reporting standards and offers extensive historical coverage, thereby enhancing the reliability, comparability, and validity of our empirical results. Macroeconomic indicators are obtained from the World Bank, while measures of institutional quality are drawn from Kunčič (2014). Cultural, religious, and linguistic variables—especially those related to future time reference (FTR) strength—are obtained from Chen (2013), Djankov et al. (2008), and Hofstede (2001), respectively.

Consistent with prior literature (e.g., Gyimah et al., 2020; Machokoto, Chipeta et al., 2021; Machokoto, Gyimah et al., 2021), we applied several data filters to improve the quality and integrity of our sample. First, we exclude firms and countries with missing observations for any of the key firm- and country-level variables. This step ensures a balanced and coherent dataset and reduces biases arising from non-random missing data patterns (see Flannery & Rangan, 2006; Oztekin, 2015; Oztekin & Flannery, 2012). Missing data may stem from firm-specific reporting practices, jurisdictional differences in disclosure requirements, or limitations in data collection.

Second, we eliminate firm-year observations characterized by abnormal growth, defined as annual changes in total assets or sales exceeding 100%. This filter mitigates the influence of extreme outliers that may reflect data entry errors, mergers and acquisitions (M&As), or firm restructuring events (see Agyei-Boapeah et al., 2020; Brav, 2009; Machokoto, Bayai et al., 2023; Machokoto et al., 2022).

Third, we restrict the sample to firms with a minimum of five firm-year observations and countries with at least 20 firm-year observations. This criterion enhances the robustness of our estimates and reduces potential biases introduced by firms or countries that appear sporadically in the dataset (see Gyimah et al., 2020; Machokoto, Gyimah et al., 2021). This step also limits the impact of statistical noise or overfitting driven by a few idiosyncratic observations, thereby helping preserve the underlying structure and representativeness of the sample.

Our final panel spans 48 countries over the period 1981 to 2019 and comprises 512,046 firm-year observations across 40,655 unique firms. Summary information on the sample distribution is presented in Appendix B.

4. Empirical results

4.1. Summary statistics and pairwise correlations

Table 1 presents summary statistics and tests of differences in mean and median for the key variables employed in our study, disaggregated by FTR-strength (i.e., strong-FTR versus weak-FTR countries). We observe that, on average, 21.98% (median: 20.30%) of total assets in our sample are financed with debt. Similarly, the average (median) long-term debt ratio (LDTD) is 22.79% (18.40%), indicating that approximately one-fifth of firms' interest-bearing debt obligations extend beyond one year. These figures are consistent with those reported in earlier cross-country studies on corporate capital structure.[3]

As shown in Table 1, approximately 46% of the firm-year observations (233,434 out of 512,046) originate from strong-FTR countries. Notably, firms in these countries exhibit a significantly higher mean (median) total debt ratio (TDA) of 22.23% (20.74%) compared to 21.76% (19.96%) in weak-FTR countries (p-value = 0.0000). The mean (median) long-term debt ratio (LDTD) is also markedly higher in strong-FTR countries—25.79% (22.49%) versus 20.27% (15.66%)—with the difference being statistically significant (p-value = 0.0000). These initial results suggest that FTR-strength may systematically influence firms' debt financing preferences, particularly favoring long-term over short-term debt.

This tendency toward longer debt maturities in strong-FTR countries may reflect linguistic and cultural framing effects associated with intertemporal decision-making. Specifically, managers in these countries may exhibit a stronger orientation toward the future, leading them to assign relatively lower weights to the perceived risks of long-term debt. This is consistent with the notion that FTR influences time perception and, consequently, the valuation of long-term financial obligations.

Interestingly, short-term debt proxies reveal that firms in strong-FTR countries are less reliant on short-term borrowing than their counterparts in weak-FTR countries. While the univariate analyses provide valuable preliminary insights, they do not account for heterogeneity across firm-, industry-, country-, or time-level factors. Therefore, in the subsequent multivariate analyses, we rigorously test our hypotheses and control for these potential confounders. Nonetheless, the preliminary findings are broadly consistent with Hypotheses 1 and 2, which posit that firms in strong-FTR countries exhibit a preference for longer-maturity debt over short-term alternatives.

Table 2 reports the pairwise correlation matrix. In line with Hypotheses 1 and 2, both total debt (TDA) and long-term debt (LDTD) are positively and significantly correlated with strong-FTR. Alternative linguistic measures of FTR-strength, such as Verb Ratio and Sentence Ratio, also show positive correlations with strong-FTR. However, their correlation with the dependent variables is statistically significant only for LDTD. Additionally, negative correlations between FTR-strength and short-term debt measures (SDA, SDM, and SDTD) further reinforce the notion that firms in strong-FTR countries are more inclined toward long-term debt financing. These correlations support the theoretical premise that speakers of strong-FTR languages tend to mentally discount future risks, viewing them as more distant and less urgent. This temporal framing may reduce perceived risks associated with long-term borrowing. Importantly, the correlations among explanatory variables are generally modest, indicating that multicollinearity is unlikely to pose significant issues in our multivariate regression analyses (see Kutner, 2005). Hence, we proceed with formal empirical testing of our hypotheses using regression frameworks that isolate the effect of FTR-strength on financing decisions while controlling for a range of firm-, industry-, and country-specific characteristics.

[3] See, for example, Ben-Nasr et al. (2021), Huang et al. (2021), Oztekin and Flannery (2012), and Oztekin (2015).

Table 1
Summary statistics.

Category		Full Sample				Weak-FTR				Strong-FTR				Strong-FTR *vs.* weak-FTR		
#	Variables	N	Mean	Median	Std.Dev	N	Mean	Median	Std.Dev	N	Mean	Median	Std.Dev	Mean	Median	Std.Dev
(1)	TDA	512,046	0.2198	0.2030	0.1707	278,612	0.2176	0.1996	0.1694	233,434	0.2223	0.2074	0.1723	0.0047***	0.0078***	0.0029***
(2)	LDTD	512,046	0.2279	0.1840	0.2143	278,612	0.2027	0.1566	0.1987	233,434	0.2579	0.2249	0.2279	0.0552***	0.0684***	0.0292***
(3)	LTDA	512,046	0.1275	0.0911	0.1332	278,612	0.1129	0.0776	0.1207	233,434	0.1450	0.1101	0.1448	0.0321***	0.0324***	0.0241***
(4)	SDA	512,046	0.0916	0.0538	0.1071	278,612	0.1041	0.0684	0.1110	233,434	0.0766	0.0381	0.1002	−0.0275***	−0.0303***	−0.0108***
(5)	NDA	512,046	0.0684	0.0906	0.2592	278,612	0.0461	0.0645	0.2561	233,434	0.0949	0.1194	0.2605	0.0488***	0.0549***	0.0044***
(6)	TLA	512,046	0.4982	0.5083	0.2011	278,612	0.4976	0.5067	0.2022	233,434	0.4989	0.5099	0.1999	0.0013**	0.0032***	−0.0023***
(7)	TDM	512,046	0.1963	0.1570	0.1750	278,612	0.1973	0.1580	0.1741	233,434	0.1952	0.1561	0.1760	−0.0021***	−0.0020***	0.0019***
(8)	LTDM	512,046	0.1112	0.0705	0.1263	278,612	0.1013	0.0616	0.1178	233,434	0.1229	0.0822	0.1348	0.0216***	0.0206***	0.0170***
(9)	SDM	512,046	0.0844	0.0412	0.1089	278,612	0.0953	0.0553	0.1105	233,434	0.0715	0.0281	0.1056	−0.0238***	−0.0272***	−0.0049***
(10)	SDTD	512,046	0.1723	0.1124	0.1822	278,612	0.1964	0.1471	0.1873	233,434	0.1435	0.0791	0.1717	−0.0529***	−0.0680***	−0.0156***
(11)	Strong-FTR	512,046	0.4559	0.0000	0.4981	278,612	0.0000	0.0000	0.0000	233,434	1.0000	1.0000	0.0000	1.0000***	1.0000***	0.0000***
(12)	Verb ratio	474,453	0.0308	0.0009	0.0395	256,569	0.0008	0.0000	0.0027	217,884	0.0660	0.0769	0.0330	0.0652***	0.0769***	0.0303***
(13)	Sentence ratio	474,453	0.0308	0.0009	0.0395	256,569	0.0008	0.0000	0.0027	217,884	0.0661	0.0769	0.0329	0.0652***	0.0769***	0.0303***
(14)	Tobin's q	512,046	1.5108	1.1858	1.1005	278,612	1.4727	1.1519	1.0960	233,434	1.5563	1.2292	1.1041	0.0836***	0.0773***	0.0081***
(15)	Sales growth	512,046	0.0720	0.0478	0.1796	278,612	0.0626	0.0380	0.1769	233,434	0.0831	0.0605	0.1822	0.0205***	0.0225***	0.0054***
(16)	ROA	512,046	0.0628	0.0588	0.0868	278,612	0.0549	0.0497	0.0767	233,434	0.0722	0.0716	0.0965	0.0173***	0.0218***	0.0198***
(17)	Size	512,046	14.9917	14.9044	2.9162	278,612	15.7359	15.6988	2.6877	233,434	14.1034	13.8457	2.9297	−1.6326***	−1.8531***	0.2420***
(18)	Tangibility	512,046	0.3131	0.2815	0.2117	278,612	0.2999	0.2751	0.1939	233,434	0.3289	0.2905	0.2301	0.0289***	0.0154***	0.0363***
(19)	DEP	512,046	0.0398	0.0346	0.0292	278,612	0.0360	0.0311	0.0279	233,434	0.0443	0.0383	0.0301	0.0082***	0.0072***	0.0022***
(20)	R&D	512,046	0.0149	0.0000	0.0357	278,612	0.0136	0.0000	0.0296	233,434	0.0164	0.0000	0.0418	0.0028***	0.0000***	0.0122***
(21)	Capex	512,046	0.0513	0.0368	0.0519	278,612	0.0456	0.0324	0.0475	233,434	0.0581	0.0421	0.0560	0.0125***	0.0097***	0.0085***
(22)	Cash	512,046	0.1530	0.1123	0.1410	278,612	0.1735	0.1370	0.1389	233,434	0.1286	0.0809	0.1395	−0.0449***	−0.0561***	0.0006**
(23)	Legal institutions	512,046	0.7725	0.8151	0.1512	278,612	0.7765	0.8249	0.1556	233,434	0.7677	0.8151	0.1457	−0.0089***	−0.0098***	−0.0099***
(24)	Political institutions	512,046	0.7247	0.7732	0.1519	278,612	0.7212	0.7805	0.1692	233,434	0.7289	0.7603	0.1280	0.0077***	−0.0202***	−0.0412***
(25)	Economic institutions	512,046	0.7165	0.7338	0.1287	278,612	0.7117	0.7334	0.1329	233,434	0.7223	0.7536	0.1231	0.0106***	0.0203***	−0.0098***
(26)	Power distance	512,046	0.0544	0.0540	0.0180	278,612	0.0567	0.0540	0.0195	233,434	0.0517	0.0460	0.0155	−0.0050***	−0.0080***	−0.0040***
(27)	Masculinity	512,046	0.0588	0.0620	0.0221	278,612	0.0626	0.0660	0.0274	233,434	0.0543	0.0620	0.0115	−0.0083***	−0.0040***	−0.0160***
(28)	Uncertainty avoidance	512,046	0.0598	0.0580	0.0248	278,612	0.0587	0.0590	0.0276	233,434	0.0611	0.0480	0.0208	0.0024***	−0.0110***	−0.0068***
(29)	Catholic	512,046	0.1846	0.0000	0.3879	278,612	0.1091	0.0000	0.3118	233,434	0.2746	0.0000	0.4463	0.1655***	0.0000***	0.1345***
(30)	GDP growth	512,046	0.0320	0.0281	0.0312	278,612	0.0347	0.0276	0.0359	233,434	0.0288	0.0285	0.0242	−0.0060***	0.0009***	−0.0117***
(31)	Inflation	512,046	0.0254	0.0195	0.0376	278,612	0.0190	0.0141	0.0361	233,434	0.0331	0.0226	0.0380	0.0140***	0.0085***	0.0020***
(32)	PrivateCredit/GDP	512,046	1.2617	1.2658	0.4927	278,612	1.3514	1.4000	0.4804	233,434	1.1545	1.1601	0.4857	−0.1969***	−0.2399***	0.0053***
(33)	StockMarketCap/GDP	512,046	1.2471	0.7735	1.9492	278,612	1.5606	0.7011	2.5681	233,434	0.8729	0.8186	0.4524	−0.6877***	0.1175***	−2.1157***

The table presents descriptive statistics for firm-level and macroeconomic variables for the full sample, along with comparative summary statistics between firms located in countries classified as having weak future time reference (`weak-FTR`) `versus` strong future time reference (`strong-FTR`) languages. TDA is the ratio of total debt to total assets and serves as a proxy for leverage. LDTD is the share of long-term debt in total debt, capturing debt maturity structure. LTDA and SDA are the ratios of long-term and short-term debt to total assets, respectively. NDA is net debt scaled by total assets. TLA denotes total liabilities to total assets. TDM, LTDM, and SDM represent total, long-term, and short-term debt relative to market value, respectively. SDTD is the proportion of short-term debt in total debt. `strong-FTR` is a dummy variable equal to one for countries with a strong future time reference, based on the linguistic classification of Chen et al. (2017). `Sentence Ratio` measures the proportion of future-oriented weather forecast sentences that contain an explicit future time marker, following the linguistic framework of Chen et al. (2017). `Verb Ratio` captures the share of future-marked verbs relative to the total number of future-tense verb constructions, also based on linguistic coding from Chen et al. (2017). `Tobin's q` is defined as the market value of equity plus total debt divided by total assets. `Sales Growth` is the year-on-year percentage change in total sales. ROA denotes return on assets. `Size` is the natural logarithm of total assets. `Tangibility` is the ratio of property, plant, and equipment to total assets. DEP, R&D, Capex, and Cash refer to depreciation, research and development expenditures, capital expenditures, and cash holdings, respectively, each scaled by total assets. `Legal institutions`, `Political institutions`, and `Economic institutions` are composite indices of institutional quality, as defined by Kunčič (2014). Cultural dimensions include `Power distance`, `Masculinity`, and `Uncertainty avoidance`, based on Hofstede (2001)'s cultural framework. `Catholic` is a binary variable equal to one if the majority of the population in a country identifies as Catholic. `GDP Growth` is the annual growth rate of real gross domestic product. `Inflation` is measured as the annual percentage change in the consumer price index (CPI). `PrivateCredit/GDP` is private sector credit as a percentage of GDP, and `StockMarketCap/GDP` is stock market capitalization relative to GDP. The sample includes 40,655 non-financial, non-utility firms (512,046 firm-year observations) drawn from Datastream over the period 1981—2019. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.2. Regression results

This section investigates whether and how `FTR-strength` influences corporate financing decisions. To begin, we estimate a simplified specification of Eq. (1), incorporating industry and year-fixed effects while excluding all control variables. The results of these univariate regressions are reported in Columns (1) and (7) of Table 3. In Column (1), where TDA is the dependent variable, the coefficient on `strong-FTR` is positive and statistically significant at the 1% level [`Coefficient` = 0.0044; `p-value` = 0.0000]. A similar pattern emerges in Column (7), where LDTD is the dependent variable: the `strong-FTR` coefficient remains positive and significant at the 1% level [`Coefficient` = 0.0500; `p-value` = 0.0000]. These findings are consistent with Hypotheses 1 and 2, which posit that firms in `strong-FTR` countries tend to adopt higher leverage and longer debt maturity structures, reflecting the short-term temporal orientation associated with `strong-FTR` languages.

To mitigate concerns about omitted variable bias, we progressively introduce control variables in Columns (2) to (6) and (8) to (12) of Table 3. These controls account for a range of firm-level, institutional, cultural, religious, and macroeconomic characteristics. Notably, even after the inclusion of these controls, `strong-FTR` maintains a consistently positive and statistically significant association with leverage at the 1% level across Columns (2) to (6). The economic magnitude of this effect is also meaningful: firms in `strong-FTR` countries employ approximately 11.56% more debt financing relative to the sample average, as indicated by the ratio of the coefficient to the mean [$\texttt{Coefficient/Mean} = \frac{0.0254}{0.2198}$], based on estimates from Column (6)—the most comprehensive specification. These results suggest that managers in `strong-FTR` environments, who are more inclined toward short-termism, exhibit a preference for debt over equity financing, potentially reflecting elevated agency costs.

Similarly, in Columns (8) to (12) of Table 3, the coefficient on `strong-FTR` remains positive and statistically significant at the 1% level for debt maturity. This result is consistent with Hypothesis 2 and suggests that firms located in `strong-FTR` countries tend to utilize significantly longer debt maturity structures compared to their counterparts in `weak-FTR` countries. The effect is also economically meaningful: based on the estimates from Column (12)—the most comprehensive model specification—firms in `strong-FTR` countries use approximately 27.16% more long-term debt relative to the average debt maturity, calculated as [$\texttt{Coefficient/Mean} = \frac{0.0619}{0.2279}$]. This evidence implies that managers in `strong-FTR` linguistic environments may place less emphasis on the risks associated with long-term obligations, leading them to favor longer maturity structures. Such preferences may stem from a reduced psychological salience of future financial constraints. Notably, these findings challenge the conventional supply-side argument that lenders prefer shorter-maturity debt to monitor managerial behavior—particularly in contexts where managerial short-termism may be more prevalent (Diamond, 1991). Instead, the results suggest that in `strong-FTR` settings, demand-side preferences may dominate maturity choices.

In sum, our findings thus far suggest that `FTR-strength` captures a culturally embedded and distinct dimension of informal institutions that helps explain cross-country differences in corporate debt levels and maturity structures. While higher leverage observed in `strong-FTR` countries may enhance creditors' ability to discipline managerial behavior and curb opportunism (Hart, 1995; Jensen, 1986), it can also heighten firms' financial fragility and exacerbate agency conflicts, especially during periods of economic distress (see Jensen & Meckling, 1976; Myers, 1977). Similarly, while longer debt maturities may facilitate long-term investment and reduce the risk of inefficient liquidation (Schiantarelli & Srivastava, 1997), they may simultaneously limit creditors' oversight and increase the potential for managerial short-termism (Diamond, 1991). These trade-offs underscore the nuanced role of temporal language structures in shaping firms' financial decision-making environments.

Table 2
Correlations.

#	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	TDA	1											
(2)	LDTD	0.663***	1										
(3)	LTDA	0.778***	0.922***	1									
(4)	SDA	0.616***	−0.099***	−0.012***	1								
(5)	NDA	0.868***	0.606***	0.688***	0.520***	1							
(6)	TLA	0.684***	0.328***	0.536***	0.417***	0.655***	1						
(7)	TDM	0.882***	0.569***	0.653***	0.585***	0.784***	0.568***	1					
(8)	LTDM	0.729***	0.851***	0.907***	0.026***	0.659***	0.473***	0.785***	1				
(9)	SDM	0.562***	−0.085***	−0.014***	0.915***	0.487***	0.358***	0.684***	0.090***	1			
(10)	SDTD	0.458***	−0.166***	−0.137***	0.905***	0.392***	0.164***	0.461***	−0.083***	0.844***	1		
(11)	Strong-FTR	0.005***	0.132***	0.120***	−0.144***	0.092***	−0.006***	−0.008***	0.088***	−0.119***	−0.159***	1	
(12)	Verb ratio	−0.002	0.094***	0.099***	−0.129***	0.053***	0.031***	−0.023***	0.063***	−0.112***	−0.148***	0.823***	1
(13)	Sentence ratio	−0.002	0.094***	0.099***	−0.129***	0.053***	0.031***	−0.022***	0.063***	−0.112***	−0.148***	0.823***	1.000***
(14)	Tobin's q	−0.179***	−0.118***	−0.122***	−0.132***	−0.237***	−0.147***	−0.353***	−0.262***	−0.262***	−0.112***	0.038***	0.038***
(15)	Sales growth	−0.010***	0.020***	0.006***	−0.022***	−0.001	−0.015***	−0.053***	−0.026***	−0.054***	−0.016***	0.064***	0.031***
(16)	ROA	−0.137***	0.003**	−0.025***	−0.186***	−0.100***	−0.145***	−0.214***	−0.104***	−0.222***	−0.162***	0.109***	0.059***
(17)	Size	0.201***	0.096***	0.128***	0.164***	0.159***	0.182***	0.207***	0.138***	0.175***	0.125***	−0.301***	−0.301***
(18)	Tangibility	0.291***	0.353***	0.313***	0.072***	0.388***	0.058***	0.307***	0.340***	0.094***	0.079***	0.072***	−0.035***
(19)	DEP	0.054***	0.144***	0.138***	−0.087***	0.111***	0.041***	0.012***	0.097***	−0.094***	−0.094***	0.133***	0.113***
(20)	R&D	−0.184***	−0.120***	−0.135***	−0.125***	−0.267***	−0.149***	−0.216***	−0.172***	−0.146***	−0.116***	0.039***	0.097***
(21)	Capex	0.112***	0.202***	0.173***	−0.037***	0.170***	0.017***	0.068***	0.143***	−0.059***	−0.027***	0.124***	0.057***
(22)	Cash	−0.392***	−0.321***	−0.331***	−0.211***	−0.737***	−0.381***	−0.379***	−0.336***	−0.217***	−0.164***	−0.163***	−0.099***
(23)	Legal institutions	−0.073***	0.097***	0.102***	−0.248***	−0.054***	0.084***	−0.069***	0.070***	−0.197***	−0.308***	−0.060***	0.124***
(24)	Political institutions	−0.051***	0.123***	0.138***	−0.257***	−0.014***	0.132***	−0.045***	0.103***	−0.196***	−0.339***	0.028***	0.152***
(25)	Economic institutions	−0.099***	0.084***	0.062***	−0.239***	−0.090***	−0.025***	−0.077***	0.036***	−0.169***	−0.258***	0.032***	0.201***
(26)	Power distance	0.050***	−0.115***	−0.124***	0.237***	0.000	−0.077***	0.090***	−0.065***	0.224***	0.301***	−0.081***	−0.164***
(27)	Masculinity	−0.029***	−0.107***	−0.088***	0.063***	−0.078***	0.001	−0.016***	−0.074***	0.061***	0.033***	−0.180***	−0.215***
(28)	Uncertainty avoidance	0.060***	−0.043***	0.002	0.093***	0.037***	0.133***	0.098***	0.027***	0.127***	0.033***	0.006***	0.038***
(29)	Catholic	0.058***	0.125***	0.135***	−0.076***	0.093***	0.124***	0.035***	0.115***	−0.079***	−0.101***	0.206***	0.127***
(30)	GDP growth	0.009***	−0.084***	−0.105***	0.148***	−0.008***	−0.101***	−0.020***	−0.104***	0.091***	0.218***	−0.083***	−0.138***
(31)	Inflation	0.018***	0.045***	0.026***	−0.004***	0.063***	−0.021***	0.016***	0.033***	−0.012***	0.017***	0.248***	0.066***
(32)	PrivateCredit/GDP	−0.030***	−0.066***	−0.061***	0.028***	−0.121***	−0.071***	−0.034***	−0.073***	0.029***	0.025***	−0.243***	−0.076***
(33)	StockMarketCap/GDP	−0.054***	−0.030***	−0.059***	−0.013***	−0.097***	−0.118***	−0.009***	−0.033***	0.025***	0.035***	−0.179***	−0.158***

#	Variables	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(13)	Sentence ratio	1											
(14)	Tobin's q	0.038***	1										
(15)	Sales growth	0.031***	0.174***	1									
(16)	ROA	0.059***	0.346***	0.260***	1								
(17)	Size	−0.301***	−0.136***	−0.030***	0.035***	1							
(18)	Tangibility	−0.034***	−0.149***	−0.001	0.015***	0.114***	1						
(19)	DEP	0.113***	0.026***	−0.025***	−0.059***	−0.165***	0.334***	1					
(20)	R&D	0.097***	0.213***	−0.003**	−0.104***	−0.121***	−0.215***	0.100***	1				
(21)	Capex	0.057***	0.069***	0.137***	0.149***	−0.059***	0.485***	0.401***	−0.045***	1			
(22)	Cash	−0.099***	0.245***	−0.007***	0.026***	−0.055***	−0.383***	−0.168***	0.264***	−0.168***	1		
(23)	Legal institutions	0.124***	−0.037***	−0.073***	0.024***	−0.155***	−0.104***	0.135***	0.142***	−0.008***	0.005***	1	
(24)	Political institutions	0.152***	−0.064***	−0.084***	0.038***	−0.124***	−0.080***	0.154***	0.128***	−0.015***	−0.045***	0.935***	1
(25)	Economic institutions	0.201***	−0.041***	−0.066***	0.009***	−0.187***	−0.096***	0.103***	0.120***	−0.028***	0.040***	0.823***	0.737***
(26)	Power distance	−0.164***	−0.053***	0.041***	−0.069***	0.245***	0.032***	−0.198***	−0.175***	−0.052***	0.062***	−0.735***	−0.745***
(27)	Masculinity	−0.215***	−0.063***	−0.063***	−0.041***	0.196***	−0.013***	−0.158***	−0.042***	−0.125***	0.108***	−0.032***	−0.029***
(28)	Uncertainty avoidance	0.038***	−0.148***	−0.079***	−0.060***	0.380***	−0.006***	−0.050***	−0.036***	−0.129***	−0.003**	−0.036***	0.144***
(29)	Catholic	0.127***	−0.013***	0.011***	0.023***	−0.100***	0.020***	0.114***	−0.037***	0.038***	−0.103***	−0.049***	0.094***
(30)	GDP growth	−0.138***	0.116***	0.164***	0.025***	−0.028***	0.050***	−0.070***	−0.036***	0.079***	0.042***	−0.388***	−0.477***
(31)	Inflation	0.066***	0.015***	0.154***	0.118***	−0.111***	0.134***	0.021***	−0.061***	0.147***	−0.093***	−0.311***	−0.282***
(32)	PrivateCredit/GDP	−0.076***	0.023***	−0.091***	−0.084***	0.185***	−0.131***	−0.135***	0.078***	−0.174***	0.189***	0.271***	0.133***
(33)	StockMarketCap/GDP	−0.158***	−0.013***	0.015***	−0.031***	0.010***	−0.064***	−0.075***	−0.046***	−0.031***	0.118***	0.105***	−0.038***

#	Variables	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
(25)	Economic institutions	1								
(26)	Power distance	−0.525***	1							
(27)	Masculinity	−0.045***	0.104***	1						
(28)	Uncertainty avoidance	−0.171***	0.119***	0.381***	1					
(29)	Catholic	−0.050***	0.129***	−0.211***	0.268***	1				
(30)	GDP growth	−0.317***	0.352***	−0.162***	−0.293***	−0.146***	1			
(31)	Inflation	−0.330***	0.148***	−0.229***	−0.124***	0.064***	0.242***	1		
(32)	PrivateCredit/GDP	0.374***	−0.137***	0.465***	0.001	−0.393***	−0.182***	−0.424***	1	
(33)	StockMarketCap/GDP	0.371***	0.177***	−0.022***	−0.343***	−0.120***	0.032***	−0.062***	0.348***	1

The table presents pairwise correlation coefficients. TDA is the ratio of total debt to total assets, serving as a proxy for leverage. LDTD is the proportion of long-term debt in total debt, capturing the debt maturity structure. LTDA and SDA represent the ratios of long-term and short-term debt to total assets, respectively. NDA denotes net debt scaled by total assets, while TLA is total liabilities to total assets. TDM, LTDM, and SDM refer to total, long-term, and short-term debt relative to market value, respectively. SDTD is the share of short-term debt in total debt. Strong-FTR is a dummy variable equal to one for countries with strong future time reference (FTR) languages, based on the linguistic classification by Chen et al. (2017). Sentence Ratio measures the proportion of future-oriented weather forecast sentences that contain an explicit future time marker, while Verb Ratio captures the share of future-marked verbs relative to all future-tense verb constructions; both indicators follow the linguistic framework in Chen et al. (2017). Tobin's q is defined as the market value of equity plus total debt, divided by total assets. Sales Growth is the year-on-year percentage change in total sales. ROA is the return on total assets. Size is measured as the natural logarithm of total assets. Tangibility is the ratio of property, plant, and equipment to total assets. DEP, R&D, Capex, and Cash represent depreciation, research and development expenditures, capital expenditures, and cash holdings, respectively, each scaled by total assets. Legal institutions, Political institutions, and Economic institutions are composite indices of institutional quality from Kunčič (2014). Cultural dimensions include Power distance, Masculinity, and Uncertainty avoidance, based on Hofstede (2001)'s cultural framework. Catholic is a binary indicator equal to one if the majority of a country's population self-identifies as Catholic. GDP Growth is the annual growth rate of real gross domestic product, and Inflation is the annual percentage change in the consumer price index (CPI). PrivateCredit/GDP refers to private sector credit as a share of GDP, while StockMarketCap/GDP measures stock market capitalization relative to GDP. The sample includes 40,655 non-financial, non-utility firms (512,046 firm-year observations) drawn from Datastream over the period 1981—2019. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.3. Robustness checks

In this subsection, we undertake a battery of tests to evaluate the robustness of our findings against a wide range of factors that may bias our inferences. Specifically, we examine the sensitivity of our results in relation to alternative variable definitions, sampling techniques, approaches to addressing outliers, model specifications, and estimation procedures, including the use of propensity score-matched samples and falsification tests.

4.3.1. Alternative proxies for debt financing and maturity

The appropriate measurement of leverage and debt maturity remains a contentious issue in the literature (see Barclay et al., 2006; Fama & French, 2002; Graham & Harvey, 2001; Rajan & Zingales, 1995; Welch, 2004). One group of scholars advocates for book-based leverage, arguing that it is less susceptible to market fluctuations driven by external events unrelated to the firm's fundamentals (see Barclay et al., 2006; Fama & French, 2002; Graham & Harvey, 2001). In contrast, others, including (Barclay et al., 2006; Frank & Goyal, 2007) and Welch (2004), contend that market-based leverage provides a more accurate reflection of a firm's financial position, as book-based measures are tied to historical values and may be subject to manipulation.[4] These divergent views highlight the concern that empirical results may be sensitive to the specific operationalization and measurement of leverage (see Dang et al., 2018; Lewellen & Lewellen, 2016; Vijh & Yang, 2013).

To address this contentious issue, we re-estimate Eq. (1) using alternative proxies for leverage and debt maturity. This approach enables

[4] Barclay et al. (2006) suggests that using book and market-based measures of leverage may not yield the same results, thus highlighting the need to reconcile the mixed results in the literature.

Table 3
The firm-level effect of FTR-strength on debt financing.

Dependent variables	Total debt						Debt maturity					
Dependent variables	TDA	TDA	TDA	TDA	TDA	TDA	LDTD	LDTD	LDTD	LDTD	LDTD	LDTD
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Strong-FTR	0.0044***	0.0243***	0.0293***	0.0262***	0.0243***	0.0254***	0.0500***	0.0575***	0.0644***	0.0683***	0.0636***	0.0619***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0006)	(0.0007)	(0.0007)	(0.0007)
Tobin's q		−0.0078***	−0.0078***	−0.0084***	−0.0087***	−0.0090***		−0.0118***	−0.0075***	−0.0090***	−0.0099***	−0.0095***
		(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)		(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Sales growth		0.0404***	0.0410***	0.0380***	0.0372***	0.0387***		0.0378***	0.0577***	0.0497***	0.0475***	0.0480***
		(0.0013)	(0.0013)	(0.0013)	(0.0013)	(0.0013)		(0.0017)	(0.0017)	(0.0016)	(0.0016)	(0.0016)
ROA		−0.3231***	−0.3207***	−0.3296***	−0.3318***	−0.3285***		−0.0400***	−0.0769***	−0.1085***	−0.1143***	−0.1175***
		(0.0030)	(0.0031)	(0.0031)	(0.0031)	(0.0031)		(0.0036)	(0.0036)	(0.0036)	(0.0036)	(0.0036)
Size		0.0107***	0.0107***	0.0116***	0.0124***	0.0124***		0.0083***	0.0097***	0.0136***	0.0157***	0.0156***
		(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)		(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Tangibility		0.1744***	0.1796***	0.1792***	0.1812***	0.1817***		0.2932***	0.3275***	0.3217***	0.3269***	0.3278***
		(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)		(0.0018)	(0.0018)	(0.0018)	(0.0018)	(0.0018)
DEP		0.0389***	0.0031	−0.0543***	−0.0816***	−0.0802***		0.3458***	0.1209***	0.0230**	−0.0473***	−0.0534***
		(0.0092)	(0.0093)	(0.0094)	(0.0094)	(0.0094)		(0.0115)	(0.0116)	(0.0117)	(0.0116)	(0.0116)
R&D		−0.4871***	−0.4983***	−0.5063***	−0.5005***	−0.4990***		−0.2268***	−0.3855***	−0.4076***	−0.3927***	−0.3929***
		(0.0066)	(0.0067)	(0.0068)	(0.0067)	(0.0067)		(0.0082)	(0.0083)	(0.0084)	(0.0083)	(0.0083)
Legal institutions			0.1856***	0.1506***	0.1826***	0.1649***			0.1180***	0.0100	0.0923***	0.1090***
			(0.0055)	(0.0059)	(0.0059)	(0.0060)			(0.0068)	(0.0073)	(0.0071)	(0.0072)
Political institutions			−0.0333***	−0.0197***	−0.0639***	−0.0582***			0.1627***	0.3325***	0.2184***	0.1952***
			(0.0044)	(0.0050)	(0.0051)	(0.0052)			(0.0054)	(0.0060)	(0.0060)	(0.0062)
Economic institutions			−0.1733***	−0.1728***	−0.1801***	−0.1836***			−0.0112**	−0.0857***	−0.1045***	−0.1051***
			(0.0034)	(0.0037)	(0.0037)	(0.0037)			(0.0044)	(0.0046)	(0.0045)	(0.0045)
Power distance				−0.3002***	−0.4864***	−0.5278***				−0.2487***	−0.7289***	−0.6490***
				(0.0196)	(0.0200)	(0.0202)				(0.0237)	(0.0242)	(0.0244)
Masculinity				−0.4316***	−0.2834***	−0.3096***				−0.5106***	−0.1281***	−0.1546***
				(0.0112)	(0.0117)	(0.0121)				(0.0136)	(0.0144)	(0.0149)
Uncertainty avoidance				−0.1326***	−0.3120***	−0.3215***				−1.0579***	−1.5206***	−1.5568***
				(0.0126)	(0.0134)	(0.0134)				(0.0154)	(0.0161)	(0.0162)
Catholic					0.0302***	0.0307***					0.0779***	0.0764***
					(0.0007)	(0.0007)					(0.0008)	(0.0008)
GDP growth						0.0354***						−0.2432***
						(0.0100)						(0.0122)
Inflation						−0.1322***						0.0817***
						(0.0075)						(0.0090)
Constant	0.2178***	0.0280***	0.0304***	0.0891***	0.0983***	0.1163***	0.2051***	−0.0067***	−0.2380***	−0.1669***	−0.1432***	−0.1326***
	(0.0003)	(0.0014)	(0.0022)	(0.0033)	(0.0033)	(0.0037)	(0.0004)	(0.0018)	(0.0025)	(0.0039)	(0.0038)	(0.0043)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046
Adj.R^2	0.046	0.169	0.174	0.178	0.181	0.182	0.055	0.167	0.194	0.210	0.224	0.225

The table presents the estimation results of Eq. (1). The dependent variables are TDA, the ratio of total debt to total assets, used as a measure of corporate leverage, and LDTD, the ratio of long-term debt to total debt, which reflects the firm's debt maturity structure. The main independent variable is strong-FTR, a dummy equal to one for countries with a strong future time reference (FTR), based on the linguistic classification by Chen et al. (2017). Control variables include: Tobin's q, defined as the market value of equity plus total debt divided by total assets; Sales Growth, the year-on-year percentage change in total sales; ROA, return on total assets; and Size, the natural logarithm of total assets. Tangibility is the ratio of property, plant, and equipment to total assets. DEP, R&D, Capex, and Cash denote depreciation, research and development expenditures, capital expenditures, and cash holdings, respectively, each scaled by total assets. Legal institutions, Political institutions, and Economic institutions are composite indices of institutional quality obtained from Kunčič (2014). Power distance, Masculinity, and Uncertainty avoidance are cultural dimensions based on Hofstede (2001)'s cross-cultural framework. Catholic is a binary indicator equal to one if a majority of the country's population self-identifies as Catholic. GDP Growth is the annual growth rate of real gross domestic product, and Inflation is measured as the annual percentage change in the consumer price index (CPI). The sample includes 40,655 non-financial, non-utility firms (512,046 firm-year observations) drawn from Datastream over the period 1981—2019. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, based on robust standard errors reported in parentheses.

Table 4
Alternative variable definitions, matched samples, and falsification tests.

Panel A:

Dependent variables	TDA_{t+2}	TDA_{t+5}	$LTDA_{t+1}$	SDA_{t+1}	NDA_{t+1}	TLA_{t+1}	TDM_{t+1}	$LTDM_{t+1}$	SDM_{t+1}	$SDTD_{t+1}$	$LDTD_{t+2}$	$LDTD_{t+5}$
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Strong-FTR	0.0240***	0.0214***	0.0400***	−0.0148***	0.0668***	0.0230***	0.0212***	0.0304***	−0.0094***	−0.0361***	0.0601***	0.0565***
	(0.0005)	(0.0006)	(0.0004)	(0.0003)	(0.0007)	(0.0006)	(0.0005)	(0.0004)	(0.0003)	(0.0005)	(0.0007)	(0.0008)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	473,306	357,086	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046	473,306	357,086
Adj.R^2	0.171	0.143	0.215	0.167	0.280	0.187	0.266	0.246	0.197	0.204	0.217	0.200

Panel B:

	Alternative independent variables				Matched samples		Matched Norep. samples		Unwinsorized dataset		Pseudo samples	
Dependent variables	TDA	LDTD	TDA	LDTD	TDA	LDTD	TDA	LDTD	TDA	LDTD	TDA	LDTD
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Verb ratio	0.4415***	0.7488***										
	(0.0065)	(0.0085)										
Sentence ratio			0.4414***	0.7491***								
			(0.0065)	(0.0085)								
Strong-FTR					0.0156***	0.0478***	0.0261***	0.0659***	0.0251***	0.0618***	−0.0004	0.0001
					(0.0016)	(0.0019)	(0.0006)	(0.0008)	(0.0005)	(0.0007)	(0.0004)	(0.0005)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	474,453	474,453	474,453	474,453	63,390	63,390	338,976	338,976	512,046	512,046	512,046	512,046
Adj.R^2	0.188	0.226	0.188	0.226	0.187	0.229	0.183	0.220	0.179	0.221	0.178	0.210

The table reports estimation results from Eq. (1). The dependent variables are various proxies for leverage and debt maturity, defined as follows: TDA is the ratio of total debt to total assets and proxies for overall leverage; LDTD is the share of long-term debt in total debt, capturing the debt maturity structure; LTDA and SDA are the ratios of long-term and short-term debt to total assets, respectively; NDA is net debt scaled by total assets; TLA denotes total liabilities to total assets; TDM, LTDM, and SDM are the ratios of total, long-term, and short-term debt to market value, respectively; and SDTD represents the proportion of short-term debt in total debt. The main independent variable is strong-FTR, a dummy equal to one for countries with a strong future time reference (FTR) languages, based on the linguistic classification of Chen et al. (2017). Two alternative linguistic variables are also used: Sentence Ratio, which measures the proportion of future-oriented weather forecast sentences containing an explicit future time marker, and Verb Ratio, which captures the ratio of future-marked verbs to all future-tense verb constructions; both follow the linguistic framework of Chen et al. (2017). Control variables (not reported for brevity) include: Tobin's q, calculated as the market value of equity plus total debt divided by total assets; Sales Growth, the annual percentage change in total sales; ROA, return on total assets; and Size, the natural logarithm of total assets. Tangibility is the ratio of property, plant, and equipment to total assets. DEP, R&D, Capex, and Cash denote depreciation, research and development expenditures, capital expenditures, and cash holdings, respectively, each scaled by total assets. Legal institutions, Political institutions, and Economic institutions are composite indices of institutional quality from Kunčič (2014). Power distance, Masculinity, and Uncertainty avoidance are cultural dimensions based on Hofstede (2001)'s framework. Catholic is a binary variable equal to one if the majority of the country's population identifies as Catholic. GDP Growth is the annual growth rate of real gross domestic product, and Inflation is measured by the annual percentage change in the consumer price index (CPI). Matched samples are constructed using propensity score nearest-neighbor matching with replacement, while Matched Norep. Samples use matching without replacement. The Unwinsorized dataset refers to results based on data without winsorization. Pseudo samples are constructed by randomly assigning countries to strong-FTR and weak-FTR groups during the first-stage classification. The sample includes 40,655 non-financial, non-utility firms (512,046 firm-year observations) drawn from Datastream over the period 1981—2019. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, based on robust standard errors reported in parentheses.

us to evaluate the sensitivity of our results and ensure comparability with findings in extant literature. The results, reported in Panel A of Table 4, include estimates based on several alternative proxies of corporate leverage and debt maturity structure: two periods forward

leverage (TDA_{t+2}), five-period forward leverage (TDA_{t+5}), long-term debt ($LTDA_{t+1}$), short-term debt (SDA_{t+1}), net debt (NDA_{t+1}), total liabilities (TLA_{t+1}), total debt to market value (TDM_{t+1}), long-term debt to market value ($LTDM_{t+1}$), short-term debt to market value (SDM_{t+1}), short-term debt to total debt ($SDTD_{t+1}$), two-period of forward debt maturity ($SDTD_{t+2}$), and five-period forward debt maturity ($LDTD_{t+5}$). By employing forward-looking proxies, we capture both the short- and long-term effects of FTR-strength on financing decisions.

As shown in Columns (1) to (3), (5) to (8), and (11) to (12) of Panel A in Table 4, the coefficient of strong-FTR remains positive and statistically significant at the 1% level across all alternative proxies of leverage and debt maturity. These results are consistent with both Hypotheses 1 and 2 and the baseline estimates presented in Table 3. Furthermore, Columns (4) and (9) to (10) in Panel A of Table 4 show that the coefficient of strong-FTR is consistently negative and significant at the 1% level for all alternative measures of short-term debt (i.e., SDA_{t+1}, SDM_{t+1}, and $SDTD_{t+1}$). This finding suggests that while firms in strong-FTR countries use more leverage overall, they rely less on short-term debt and prefer long-term debt. This pattern aligns with the notion that managers in strong-FTR countries are more inclined to heavily discount the risks associated with long-term debt. Overall, these additional analyses affirm that our findings are robust when using alternative definitions of leverage and debt maturity structure.

4.3.2. Alternative measures of FTR-strength

The validity of our results may depend on how the strength of future-time reference (FTR-strength) is defined and operationalized. As such, we assess the robustness of our findings to alternative specifications by considering two alternative proxies for the FTR-strength variable: the *Sentence Ratio* and *Verb Ratio*. Extant studies demonstrate that these proxies are positively correlated with FTR-strength (Chen et al., 2017; Chi et al., 2020; Kim et al., 2017; Kong et al., 2022). The *Sentence Ratio* captures the proportion of future weather-related sentences that contain an explicit future marker, while the *Verb Ratio* represents the share of verbs that are future-marked relative to all future-intended verbs. Columns (1) to (4) of Panel B in Table 4 present the estimation results using these alternative FTR-strength measures. Consistent with our baseline findings, both *Sentence Ratio* and *Verb Ratio* are positively and significantly associated with leverage and debt maturity. These findings align with Hypotheses 1 and 2 and, more importantly, confirm the robustness of our central findings to alternative measures of linguistic FTR-strength.

4.3.3. Addressing self-selection bias

A potential limitation of our analysis lies in the possibility of self-selection bias. Specifically, a firm's location in a strong-FTR or weak-FTR country may not be entirely exogenous. To address this concern, we adopt a Propensity Score Matching (PSM) approach following prior literature (see Chen et al., 2017; Chi et al., 2020; He & Zhang, 2022). PSM enables the construction of a matched sample in which firms located in strong-FTR countries (treated firms) are paired with observationally similar firms from weak-FTR countries (non-treated firms), based on a set of observable firm-level characteristics. This methodology mitigates the confounding effects of firm-specific heterogeneity, thereby isolating the influence of FTR-strength on financing decisions. We begin by estimating a probit model in which the probability of a firm being located in a strong-FTR country is regressed on firm-level covariates.[5] The resulting propensity scores are then used to match each treated firm with the nearest observationally equivalent non-treated firm. We conduct the matching both with and without replacement to assess robustness. Panel B of Table 4 reports the results of re-estimating Eq. (1) on the matched samples: Columns (5) and (6) show the results for matching with replacement, while Columns (7) and (8) present the results for matching without replacement. In both specifications, the coefficient on strong-FTR remains positive and statistically significant for both leverage and debt maturity. These results reinforce our main findings and suggest that they are unlikely to be influenced by self-selection bias.

4.3.4. Alternative approaches to addressing outliers

Because the approaches we used to mitigate outliers (i.e., winsorization) might influence our results, we next gauge the sensitivity of our results using an unwinsorized dataset. The results, tabulated in Columns (9) and (10) of Panel B in Table 4, show that strong-FTR has a consistently significant positive effect on both leverage [Coefficient = 0.0261, p-value = 0.0000] and debt maturity [Coefficient = 0.0659, p-value = 0.0000]. The economic magnitude of this effect is significant: firms in countries with strong-FTR languages are likely to have about 11.42% [Coefficient/Mean = 0.0251/0.2198] higher financial leverage and about 27.12% [Coefficient/Mean = 0.0618/0.2279] higher debt maturity, which aligns with our primary findings. Additionally, we conduct robustness tests by trimming observations in the top and bottom percentiles of the distribution. These untabulated results yield qualitatively similar conclusions. Overall, these tests suggest that our core findings are not driven by extreme observations or the method of handling outliers.

4.3.5. Falsification tests

To address concerns that our findings might arise by random chance or be attributable to spurious correlations, we conduct falsification (placebo) tests. In these tests, we randomly reassign firms to strong-FTR and weak-FTR country subgroups and re-estimate Eq. (1) using these pseudo-treatment assignments. Columns (11) and (12) of Panel B in Table 4 present the results of these falsification exercises for leverage and debt maturity, respectively. As expected, the estimated coefficients on strong-FTR are statistically indistinguishable from zero, providing no evidence of systematic differences when the FTR-strength classification is randomized. This result reinforces our interpretation that the observed effects are not driven by latent, non-random factors associated with the geographic distribution of firms but instead reflect genuine variation associated with linguistic future-time reference strength.

4.3.6. Addressing disproportionate weighing of countries in regression models

Researchers working with large international firm-level datasets often face an empirical challenge of disproportionate weighting, where countries with more firm-year observations exert greater influence in regression analyses. To address this non-trivial concern, we employ three strategies from the extant literature (Gyimah et al., 2020; Kadzima et al., 2024; Machokoto, Chipeta et al., 2021). First, we re-estimate the baseline model using an industry-country-year panel dataset constructed by averaging firm-specific variables within each industry-country-year grouping or cell. Second, we also use a country-year aggregated dataset constructed by calculating the averages of firm-specific variables within each country-year grouping. Third, we use weighted regressions, where the weight is either the inverse of the number of observations per country (WLS1) or the inverse of the square root of the number of observations per country (WLS2), to address the disproportionate weighting of countries in regression models (Machokoto, Bayai et al., 2023; Machokoto, Kadzima et al., 2023). Finally, we re-estimate the baseline model after sequentially excluding countries with the largest number of observations, such as the United States (ExUSA) and Japan (ExJPN).

[5] The covariates included in the probit model are: Tobin's q, sales growth (Sales Growth), return on assets (ROA), firm size (Size), asset tangibility (Tangibility), changes in depreciation expense (ΔDEP), and R&D intensity (R&D).

Table 5
Alternative subsamples, models and aggregated and weighted regressions.

Panel A:												
	Industry-country-year		Country-year		WLS1		WLS2		ExUSA		ExJPN	
Dependent variables	TDA	LDTD	TDA	LDTD	TDA	LDTD	TDA	LDTD	TDA	LDTD	TDA	LDTD
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Strong-FTR	0.0061***	0.0317***	0.0168***	0.0379***	0.0122***	0.0417***	0.0122***	0.0417***	0.0049***	0.0106***	0.0193***	0.0491***
	(0.0022)	(0.0028)	(0.0038)	(0.0053)	(0.0006)	(0.0008)	(0.0006)	(0.0008)	(0.0006)	(0.0007)	(0.0006)	(0.0007)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	8,400	8,400	1,466	1,466	512,046	512,046	512,046	512,046	435,031	435,031	426,795	426,795
Adj.R^2	0.312	0.371	0.339	0.392	0.173	0.229	0.173	0.229	0.186	0.239	0.184	0.219
Panel B:												
	Initial leverage		Additional controls		Alternative fixed effects				TOBIT		Fama McBerth	
Dependent variables	TDA	LDTD	TDA	LDTD	TDA	LDTD	TDA	LDTD	TDA	LDTD	TDA	LDTD
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Strong-FTR	0.0116***	0.0318***	0.0238***	0.0596***	0.0249***	0.0619***	0.0249***	0.0611***	0.0261***	0.0713***	0.0388***	0.0688***
	(0.0004)	(0.0006)	(0.0005)	(0.0007)	(0.0005)	(0.0007)	(0.0005)	(0.0007)	(0.0006)	(0.0008)	(0.0065)	(0.0078)
PrivateCredit/GDP			0.0243***	0.0109***								
			(0.0008)	(0.0009)								
StockMarketCap/GDP			−0.0029***	−0.0051***								
			(0.0002)	(0.0002)								
Initial Leverage	0.4909***	0.4564***										
	(0.0014)	(0.0015)										
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	No	No	No	No	No	Yes	Yes	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046	512,046
Adj.R^2	0.395	0.396	0.184	0.226	0.175	0.214	0.186	0.228				

The table reports the estimation results of Eq. (1). The dependent variables are TDA, the ratio of total debt to total assets, which proxies for leverage, and LDTD, the proportion of long-term debt in total debt, capturing the debt maturity structure. The main independent variable is `strong-FTR`, a dummy equal to one for countries with a strong future time reference (FTR) languages, based on the linguistic classification of Chen et al. (2017). Control variables included in the models but omitted from the table for brevity are: `Tobin's q`, defined as the market value of equity plus total debt divided by total assets; `Sales Growth`, the year-on-year percentage change in total sales; `ROA`, return on assets; and `Size`, the natural logarithm of total assets. `Tangibility` is the ratio of property, plant, and equipment to total assets. `DEP`, `R&D`, `Capex`, and `Cash` represent depreciation, research and development expenditures, capital expenditures, and cash holdings, respectively, each scaled by total assets. `Legal institutions`, `Political institutions`, and `Economic institutions` are composite indices of institutional quality from Kunčič (2014). `Power distance`, `Masculinity`, and `Uncertainty avoidance` are cultural dimensions drawn from Hofstede (2001). `Catholic` is a binary indicator equal to one if the majority of a country's population identifies as Catholic. `GDP Growth` is the annual growth rate of real gross domestic product, while `Inflation` is the annual percentage change in the consumer price index (CPI). Additional controls include `PrivateCredit/GDP`, the ratio of private sector credit to GDP, and `StockMarketCap/GDP`, stock market capitalization as a share of GDP. `Initial Leverage` refers to a firm's leverage and debt maturity at the time it first enters the dataset. `Industry-country-year` and `Country-year` indicate aggregate regressions at the respective levels. Weighted least squares models use weights equal to the inverse (`WLS1`) or inverse square root (`WLS2`) of the number of observations per country. Subsample analyses exclude firms from countries with disproportionately large samples, such as the USA (ExUSA) and Japan (ExJPN). Additional models include TOBIT and Fama-MacBeth estimations. The sample includes 40,655 non-financial, non-utility firms (512,046 firm-year observations) drawn from Datastream over the period 1981—2019. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, based on robust standard errors reported in parentheses.

Panel A of Table 5 presents the results of these robustness checks. Columns (1) and (2), based on the industry-country-year aggregated sample, show that firms in `strong-FTR` countries are associated with significantly higher financial leverage [`Coefficient` = 0.0061, `p-value` = 0.0000] and longer debt maturity [`Coefficient` = 0.0317, `p-value` = 0.0000]. Similarly, Columns (3) and (4), using country-year aggregated data, corroborate these findings with statistically significant and positive effects on leverage [`Coefficient` = 0.0168, `p-value` = 0.0000] and debt maturity [`Coefficient` = 0.0379, `p-value` = 0.0000]. In Columns (5) to (8), we report results from the weighted regressions (`WLS1` and `WLS2`). These also reveal that `strong-FTR` remains positively and significantly associated with both leverage and debt maturity at the 1% level. To further ensure that dominant countries do not bias the results, we re-estimate the baseline model in Columns (9) to (12) after excluding firms from the USA (15.04% of the sample) and Japan (16.65%). The coefficient on `strong-FTR` remains consistently positive and statistically significant at the 1% level across all subsamples.[6] Overall, the findings in Panel A of Table 5 suggest that our baseline results are robust and not driven by the overrepresentation of a few countries with disproportionately large firm-year counts.

4.3.7. Alternative model specifications

Extant empirical research in accounting and finance consistently finds that leverage is a highly persistent firm characteristic, and several scholars have called for further inquiry into time-invariant determinants of financing choice (see Graham & Leary, 2011; Lemmon et al., 2008; Wu & Au Yeung, 2012). Although the determinants of corporate financing choice remain only partially understood, much of the variation is attributed to firm-specific fixed effects that do not vary over time (Flannery & Rangan, 2006; Graham & Leary, 2011; Parsons & Titman, 2007; Rauh & Sufi, 2012). Accordingly, a number of studies emphasize the importance of identifying time-invariant factors, given the limited explanatory power of time-varying variables (Flannery & Rangan, 2006; Parsons & Titman, 2007; Rauh & Sufi, 2012). However, this view has been challenged by DeAngelo and Roll (2015), who provides evidence that firms frequently revise their financing policies. They argue that the perceived stability in corporate capital structure is often temporary and confined mainly to firms operating at low leverage levels.

In light of this debate, we augment Eq. (1) by including initial leverage or debt maturity as additional regressors. Specifically, we incorporate the total debt-to-total assets ratio or the long-term debt-to-total debt ratio in the first year a firm enters our dataset.[7] This allows us to isolate the effect of `FTR-strength` on leverage and debt maturity from persistence effects associated with firms' initial capital structure and debt maturity choices. The results, presented in Columns (1) and (2) of Panel B in Table 5, indicate that initial leverage and debt maturity have statistically significant and positive effects on current leverage and debt maturity, consistent with earlier findings (Graham & Leary, 2011; Lemmon et al., 2008; Wu & Au Yeung, 2012). More importantly, even after accounting for initial conditions, `strong-FTR` retains a positive and significant effect on leverage [`Coefficient` = 0.0116, `p-value` = 0.0000] and debt maturity [`Coefficient` = 0.0318, `p-value` = 0.0000]. These findings suggest that the influence of `FTR-strength` on capital structure and debt maturity is not merely a reflection of persistence.

Nonetheless, the potential for omitted variable bias—especially at the national level—remains a valid concern. We cannot include country-fixed effects, as our main explanatory variable, `strong-FTR`, is measured at the country level. To address this limitation, we control

[6] Untabulated results (available upon request) confirm similar patterns when excluding firms from other high-frequency countries such as France (ExFRA), Hong Kong (ExHKG), the UK (ExGBR), Germany (ExDEU), and Taiwan (ExTWN).

[7] This approach is employed due to the absence of data on firms' initial leverage when it was established.

for cross-country differences in financial development by including two additional macro-level variables: the private credit-to-GDP ratio (PrivateCredit/GDP) and stock market capitalization-to-GDP ratio (StockMarketCap/GDP). These controls are commonly used in prior research to proxy for variations in access to finance across countries (Antzoulatos et al., 2016; Oztekin & Flannery, 2012). As shown in Columns (3) and (4) of Panel B in Table 5, the coefficients of strong-FTR remain positive and statistically significant at the 1% level, reinforcing the robustness of our baseline results.

To further assess the robustness of our findings to model specification, we re-estimate several variants of Eq. (1) that include different combinations of fixed effects—namely industry, year, and industry-year fixed effects. Incorporating these fixed effects helps address potential bias from both time-varying and time-invariant omitted factors (see Bebchuk et al., 2015). The results, reported in Columns (5) through (8) of Panel B in Table 5, show that the coefficients on strong-FTR remain consistently positive and significant at the 1% level across all specifications. Taken together, these additional analyses—accounting for initial conditions, financial development, and various fixed effects—support the robustness of our main findings and reduce the likelihood that omitted variable bias drives the observed relationship between FTR-strength and firms' leverage and debt maturity.

4.3.8. Alternative econometric procedures

Extant literature has shown that ordinary least squares (OLS) estimates from linear regression models may be biased and inconsistent when applied to dependent variables that are bounded and censored—such as the ratio of total debt to total assets (leverage) or long-term debt to total debt (debt maturity), both of which are censored at zero and one (Elsas & Florysiak, 2011; Machokoto, Chipeta et al., 2021). To address this concern, we re-estimate our baseline model, Eq. (1), using Tobit (censored) regression models via maximum likelihood estimation. The results, reported in Columns (9) and (10) of Panel B in Table 5, indicate that strong-FTR continues to exert a statistically significant positive effect on both leverage and debt maturity at the 1% significance level. Specifically, the Tobit estimates imply that firms in countries with strong-FTR exhibit approximately 11.87% [Coefficient/Mean = 0.0261/0.2198] higher financial leverage and approximately 31.29% [Coefficient/Mean = 0.0713/0.2279] greater reliance on long-term debt.

In addition, we implement the Fama and MacBeth (1973)'s two-step procedure to re-estimate Eq. (1) on a year-by-year basis. This approach helps mitigate potential violations of the classical linear regression assumptions, including those arising from measurement error, multicollinearity, or autocorrelation of residuals. The time-series averages of the coefficients derived from this procedure are presented in Columns (11) and (12) of Panel B in Table 5. These results show that FTR-strength retains a statistically significant positive effect on both leverage [Coefficient = 0.0388, p-value = 0.0000] and debt maturity [Coefficient = 0.0688, p-value = 0.0000], consistent with our main findings.

Taken together, the robustness of our results across alternative estimation techniques—Tobit regressions and the Fama and MacBeth (1973)'s two-step procedure—suggests that our core conclusions are not driven by model specification. We, therefore, reaffirm that strong-FTR is associated with higher financial leverage and longer debt maturity, consistent with Hypotheses 1 and 1.

4.3.9. Alternative sampling frames

In this subsection, we conduct additional sensitivity analyses to assess the robustness of our empirical results to alternative sampling frames and to examine whether compositional shifts in the corporate universe might influence our findings. Following prior literature (see Chen et al., 2017), we re-estimate our baseline model using subsamples that exclude multilingual countries (ExMult), Confucian countries (ExConf.), and Asian countries (ExAsia).[8]

The corresponding results are reported in Columns (1)—(2) and (7)—(8) of Panel A in Table 6. We also examine whether the observed relationship between FTR-strength and both leverage and debt maturity is influenced by major macroeconomic shocks. Specifically, we estimate Eq. (1) using subsamples that exclude the periods associated with the Global Financial Crisis, the 1997/1998 Asian Financial Crisis, and the European Sovereign Debt Crisis. The resulting estimates for the ExGFCrisis, ExAsiaCrisis, and ExEUCrisis subsamples are reported in Columns (4) to (6) and (10) to (12) of Panel A in Table 6.[9] Across all subsamples, the coefficients on strong-FTR remain positive and statistically significant, reinforcing the robustness of our core findings. These results suggest that the positive association between FTR-strength and both leverage and debt maturity is not driven by multilingual or Confucian contexts nor by crisis-specific firm-year observations.

Given the well-documented shift in firm characteristics as economies transition from tangible-asset-heavy sectors (e.g., manufacturing) to intangible-intensive sectors (e.g., services and technology) (Buera & Kaboski, 2012; Kahle & Stulz, 2017; Machokoto, Areneke and Nyangara, 2020), we further investigate whether such structural transformations affect our results. We also assess the potential influence of variations in population structure and FTR-strength over time. To this end, we re-estimate Eq. (1) by decade: the 1980s (1980—1989), 1990s (1990—1999), 2000s (2000—2009), and 2010s (2010—2019). The results, presented in Columns (1)—(4) and (7)—(8) of Panel B in Table 5, show that the effect of strong-FTR remains positive and statistically significant (at the 1% level) for both leverage and debt maturity across all decades, indicating the persistence of our findings over time.

We further observe a decline in the cross-sectional differences in leverage and debt maturity between strong-FTR and weak-FTR countries over the decades. These differences fall from a peak of 45.59% in the 1980s to 13.69% in the 1990s, then to a low of 6.60% in the 2000s, before rising to 11.33% in the 2010s.[10] These temporal dynamics are notable given ongoing capital market developments and increases in firm leverage over the past few decades (Graham et al., 2015; Machokoto, Areneke and Nyangara, 2020), and they may inform future inquiries into the evolving influence of time-invariant factors such as language structure.

Lastly, we investigate the potential impact of the Global Financial Crisis more directly by estimating Eq. (1) separately for the pre-crisis and post-crisis periods. The corresponding results are presented in Columns (5)—(6) and (11)—(12) of Panel B in Table 5. We find that the estimated differences in leverage and debt maturity between firms in strong-FTR and weak-FTR countries increased from approximately 4.73% (leverage) and 6.32% (debt maturity) in the pre-crisis period to 6.55% and 15.05%, respectively, during the crisis period. However, the post-crisis period exhibits a narrowing in the differences for debt maturity, suggesting that the contraction in long-term lending following the Global Financial Crisis may have played a role in reducing the debt maturity gap between firms in strong-FTR and weak-FTR countries.

[8] The ExMult sub-sample excludes Belgium, Malaysia, Switzerland, Canada, Singapore, and Hong Kong. The ExConf. subsample excludes China, Hong Kong, Japan, Korea, Rep., Singapore, Taiwan, and Vietnam (see Chen et al., 2017). The ExAsia sub-sample excludes China, India, Indonesia, Pakistan, Japan, Philippines, Vietnam, Turkey, Thailand, Korea, Rep., Malaysia, Singapore, Taiwan, and Hong Kong.

[9] ExGFCrisis excludes the years 2008 and 2009. ExAsiaCrisis excludes 1997 and 1998. ExEUCrisis excludes the period from 2009 to 2019.

[10] The percentages are computed as the ratio of the estimated coefficient for strong-FTR to the mean of the dependent variable [i.e., Coefficient/Mean].

Table 6
Further subsample and time variation analyses.

Panel A:												
Subsamples	ExMult	ExConf.	ExAsia	ExGFCrisis	ExAsiaCrisis	ExEUCrisis	ExMult	ExConf.	ExAsia	ExGFCrisis	ExAsiaCrisis	ExEUCrisis
Dependent variables	TDA	TDA	TDA	TDA	TDA	TDA	LDTD	LDTD	LDTD	LDTD	LDTD	LDTD
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Strong-FTR	0.0224***	0.0211***	0.0218***	0.0261***	0.0246***	0.0263***	0.0574***	0.0460***	−0.0110***	0.0635***	0.0600***	0.0706***
	(0.0006)	(0.0007)	(0.0016)	(0.0005)	(0.0005)	(0.0007)	(0.0007)	(0.0009)	(0.0018)	(0.0007)	(0.0007)	(0.0009)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	435,705	319,664	244,338	469,941	491,009	272,413	435,705	319,664	244,338	469,941	491,009	272,413
Adj.R^2	0.190	0.194	0.222	0.181	0.181	0.181	0.232	0.226	0.232	0.224	0.225	0.227
Panel B:												
Subsamples	1980s	1990s	2000s	2010s	Pre-GFCrisis	GFCrisis	1980s	1990s	2000s	2010s	Pre-GFCrisis	GFCrisis
Dependent variables	TDA	TDA	TDA	TDA	TDA	TDA	LDTD	LDTD	LDTD	LDTD	LDTD	LDTD
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Strong-FTR	0.1002***	0.0301***	0.0145***	0.0249***	0.0104***	0.0144***	0.1396***	0.0673***	0.0534***	0.0456***	0.0518***	0.0351***
	(0.0024)	(0.0013)	(0.0009)	(0.0009)	(0.0012)	(0.0012)	(0.0031)	(0.0016)	(0.0011)	(0.0011)	(0.0015)	(0.0015)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	30,115	86,482	177,197	218,252	107,519	108,957	30,115	86,482	177,197	218,252	107,519	108,957
Adj.R^2	0.234	0.199	0.190	0.191	0.186	0.204	0.306	0.234	0.240	0.239	0.239	0.244
Panel C:												
Subsamples	IND	Non-IND	CDS	CGS	OTHERS	TTT	IND	Non-IND	CDS	CGS	OTHERS	TTT
Dependent variables	TDA	TDA	TDA	TDA	TDA	TDA	LDTD	LDTD	LDTD	LDTD	LDTD	LDTD
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Strong-FTR	0.0343***	0.0224***	0.0269***	0.0408***	0.0024**	0.0218***	0.0770***	0.0558***	0.0598***	0.0705***	0.0446***	0.0506***
	(0.0010)	(0.0006)	(0.0012)	(0.0016)	(0.0011)	(0.0013)	(0.0013)	(0.0008)	(0.0015)	(0.0019)	(0.0014)	(0.0017)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	140,274	371,772	114,716	50,213	122,522	84,321	140,274	371,772	114,716	50,213	122,522	84,321
Adj.R^2	0.186	0.184	0.150	0.121	0.156	0.296	0.250	0.222	0.188	0.157	0.203	0.324

The table presents the estimation results of Eq. (1). The dependent variables are TDA, the ratio of total debt to total assets, which proxies for leverage, and LDTD, the ratio of long-term debt to total debt, which captures the debt maturity structure. The main independent variable is `strong-FTR`, a dummy equal to one for countries with a strong future time reference (FTR) languages, based on the linguistic classification by Chen et al. (2017). Control variables included in the models but omitted from the table for brevity are as follows: `Tobin's q`, defined as the market value of equity plus total debt divided by total assets; `Sales Growth`, the year-on-year percentage change in total sales; `ROA`, return on assets; and `Size`, the natural logarithm of total assets. `Tangibility` is the ratio of property, plant, and equipment to total assets. `DEP`, `R&D`, `Capex`, and `Cash` denote depreciation, research and development expenditures, capital expenditures, and cash holdings, respectively, each scaled by total assets. `Legal institutions`, `Political institutions`, and `Economic institutions` are composite indices of institutional quality from Kunčič (2014). `Power distance`, `Masculinity`, and `Uncertainty avoidance` are cultural dimensions based on Hofstede (2001)'s cross-cultural framework. `Catholic` is a binary indicator equal to one if a majority of the country's population self-identifies as Catholic. `GDP Growth` is the annual growth rate of real GDP, and `Inflation` is measured by the annual percentage change in the consumer price index (CPI). Subsamples exclude the following: multilingual countries (`ExMult`), Confucian countries (`ExConf.`), Asian countries (`ExAsia`), the Global Financial Crisis period (`ExGFCrisis`), the 1997/98 Asian crises (`ExAsiaCrisis`), and the European Debt Crisis (`ExEUCrisis`). `Pre-GFCrisis` and `GFCrisis` refer to the periods 2002—2007 and 2008—2009, respectively. Decade-based subsamples are defined as: 1980s (1980—1989), 1990s (1990—1999), 2000s (2001—2009), and 2010s (2010—2019). Sectoral subsamples include industrials (`IND`), non-industrials (`Non-IND`), Consumer Discretionary (CDS), Consumer Staples (CGS), others (OTHERS), and technology & telecommunications (TTT). The sample includes 40,655 non-financial, non-utility firms (512,046 firm-year observations) drawn from Datastream over the period 1981—2019. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, based on robust standard errors reported in parentheses.

4.3.10. *Within-country analysis of the effect of FTR-strength*

Although we conduct several robustness checks, a remaining concern is that our results may still be influenced by cross-country differences in unobserved factors correlated with `FTR-strength` (see Kim et al., 2017, 2020). To address this concern, we perform an in-country analysis by estimating Eq. (1) using a sample of firms headquartered in Switzerland—a multilingual country where both `strong-FTR` and `weak-FTR` languages are natively spoken. Specifically, we classify firms located in regions where French, Italian, or Romansh is the most widely spoken language as part of the `strong-FTR` group and firms located in regions where German is the predominant language as belonging to the `weak-FTR` group. Firms located in bilingual regions are excluded from the analysis to avoid potential language classification ambiguities. To further mitigate potential self-selection bias, we apply the propensity score matching (PSM) approach described in Section 4.3.3, ensuring that firms in `strong-FTR` and `weak-FTR` regions are matched based on observable firm-level characteristics. The results of this in-country test are presented in Appendix C. Consistent with our main findings, we find that `strong-FTR` retains a positive and statistically significant coefficient at the 1% level. This result remains robust across alternative definitions of leverage and debt maturity. Overall, this in-country analysis provides additional support for our hypotheses by isolating the effect of `FTR-strength` within a single national and institutional context. It helps rule out the possibility that the documented effects are driven by unobserved cross-country differences unrelated to language structure.

4.4. Additional analyses

4.4.1. *Firm-level difference-in difference analyses*

Next, we exploit several quasi-natural experiments to address potential endogeneity concerns and, more importantly, to shed light on the mechanisms driving our results. Specifically, we examine how `FTR-strength` influences corporate financing decisions around four exogenous events: the Handover of Hong Kong, the Global Financial Crisis, the adoption of IFRS, and the implementation of mandatory board reforms worldwide.[11] These events are plausibly exogenous to the financing and investment opportunities of the non-utility and non-financial firms in our sample, thus allowing for a cleaner identification strategy. Notably, prior studies in corporate finance adopt similar designs to address identification concerns (Chen et al., 2017; Chi et al., 2020; Machokoto, Chipeta et al., 2021; Popov & Rocholl, 2018).

To implement our quasi-natural experiments, we estimate the following four difference-in-differences models:

$$\begin{aligned} y_{ijkt} =& \gamma_0 + \gamma_1 \texttt{Hong Kong} + \gamma_2 \texttt{Post-1997 Hangover}_t \\ &+ \gamma_3 \texttt{Hong Kong} \times \texttt{Post-1997 Hangover}_t \\ &+ \boldsymbol{\theta} \boldsymbol{Z}_{ijkt-1} + \eta_j + \eta_t + \xi_{ijkt} \end{aligned} \tag{2a}$$

$$\begin{aligned} y_{ijkt} =& \gamma_0 + \gamma_1 \texttt{strong-FTR}_k + \gamma_2 \texttt{GFCrisis}_t \\ &+ \gamma_3 \texttt{strong-FTR}_k \times \texttt{GFCrisis}_t \\ &+ \boldsymbol{\theta} \boldsymbol{Z}_{ijkt-1} + \eta_j + \eta_t + \xi_{ijkt} \end{aligned} \tag{2b}$$

$$\begin{aligned} y_{ijkt} =& \gamma_0 + \gamma_1 \texttt{strong-FTR}_k + \gamma_2 \texttt{Post-IFRS}_{kt} \\ &+ \gamma_3 \texttt{strong-FTR}_k \times \texttt{Post-IFRS}_{kt} \\ &+ \boldsymbol{\theta} \boldsymbol{Z}_{ijkt-1} + \eta_j + \eta_t + \xi_{ijkt} \end{aligned} \tag{2c}$$

$$\begin{aligned} y_{ijkt} =& \gamma_0 + \gamma_1 \texttt{strong-FTR}_k + \gamma_2 \texttt{Post-Board}_{kt} \\ &+ \gamma_3 \texttt{strong-FTR}_k \times \texttt{Post-Board}_{kt} \end{aligned}$$

[11] Data on IFRS adoption are drawn from Song and Trimble (2020), and board reform data are from Chen et al. (2022) and Fauver et al. (2017).

$$+ \theta \boldsymbol{Z}_{ijkt-1} + \eta_j + \eta_t + \xi_{ijkt} \quad (2d)$$

where i, j, k and t index for firm, industry, country and year, respectively. y captures corporate debt financing decisions and is proxied by either a firm's leverage ratio (TDA — the ratio of total debt to total assets) or its debt maturity (LDTD — the ratio of long-term debt total debt), γ_0 is a constant. γ_1, γ_2, γ_3 and θ are coefficients to be estimated. Strong-FTR is a binary indicator equal to one for firms in strong-FTR countries. Hong Kong is a dummy variable that takes the value of one for firms in Hong Kong and zero otherwise. Post-1997 Hangover is a dummy variable that takes the value of one from 1997 onwards and zero otherwise. GFCrisis is a dummy variable that takes the value of one for 2008—2009 and zero otherwise. Post-IFRS is a dummy variable that takes the value of one from the year when a country adopts IFRS and zero otherwise. Post-Board is a dummy variable that takes the value of one from the year when a country implements mandatory board reforms and zero otherwise. The vector of lagged control variables, $\boldsymbol{Z}_{ijkt}$, is as defined previously in Eq. (1). η_j, η_k and η_t are industry, country and year-fixed effects, respectively. Finally, ξ_{ijkt} is the error term. As we cannot include country-fixed effects in our empirical models, given that strong-FTR is time-invariant, we address this limitation by saturating our models with country-specific control variables (as indicated earlier in Section 3.1). For each quasi-natural experiment, we limit our analysis to the period surrounding the event, ranging from 5 years before to 5 years after [−5, +5], in order to reduce the impact of other confounding events.[12] Table 7 presents the results of estimating Eqs. (2a)—(2d) for our four quasi-natural experiments.

4.4.1.1. The 1997 Handover of Hong Kong from the United Kingdom to China. The first quasi-natural experiment examines the 1997 Handover of Hong Kong from the United Kingdom to China and its impact on corporate leverage and debt maturity. This event represents one of the few documented transitions from English (a strong-FTR language) to Mandarin (a weak-FTR language). Accordingly, we hypothesize that the 1997 Handover of Hong Kong resulted in a decline in both leverage and debt maturity in the post-1997 period. To test this hypothesis, we focus on a subsample comprising the Asian Tigers and countries affected by the Asian Crisis (Asian Crisis). The sub-sample of Asian Tigers includes Hong Kong, Singapore, Korea, Rep., and Taiwan, while the sub-sample of countries affected by the Asian Crisis includes Hong Kong, Indonesia, Korea, Rep., Taiwan, Singapore, Philippines, China, Thailand, and Malaysia.

As reported in Columns (1) and (2) of Panels A and B of Table 7, the coefficient on the Hong Kong dummy is negative and significant for leverage, indicating that firms in Hong Kong maintained lower leverage than those in comparator countries. In contrast, the coefficient on the Hong Kong dummy for debt maturity is positive and significant, implying that Hong Kong firms exhibited longer debt maturity relative to peers in the Asian Tigers and Asian Crisis groups. The coefficient on the Post-1997 Handover dummy yields mixed results—positive when using the Asian Tigers subsample [Column (1), Panels A and B of Table 7], and negative when using the Asian Crisis subsample [Column (2), Panels A and B of Table 7]. These contrasting results suggest the presence of underlying heterogeneity, motivating a deeper examination of the role of FTR-strength. Crucially, the interaction term, Hong Kong×Post-1997, is consistently negative and significant at the 1% level across specifications. This finding indicates a substantial post-Handover decline in both leverage and debt maturity, consistent with a shift from a strong-FTR to a weak-FTR linguistic environment. This result lends empirical support to both Hypotheses 1 and 2.

[12] Appendix D shows the robustness of our findings to alternative windows, such as the [−4, +4] period.

4.4.1.2. The global financial crisis. The second quasi-natural experiment investigates whether the strength of future time reference (FTR) moderates corporate financing behavior during the Global Financial Crisis (GFC). The literature remains divided on the consequences of financial crises for corporate financing behavior (see Almeida et al., 2012; Chava & Purnanandam, 2011; González, 2015; Kahle & Stulz, 2013; Machokoto, Areneke and Ibrahim, 2020). On one side, heightened uncertainty, increased risk, and expected declines in returns during the financial crisis (GFCrisis) may make capital providers reluctant to supply equity financing or commit to long-term lending. This perspective suggests that financial crises can lead to increased leverage and reduced debt maturity (Demirgüç-Kunt et al., 2020). Moreover, borrowers may prefer long-term debt to avoid refinancing risks that come with short-term debt in bad times (Diamond, 1991), thereby increasing long-term debt. Conversely, credit supply contractions during times of financial crisis may force firms to reduce leverage and truncate debt maturity (see Almeida et al., 2012; Chava & Purnanandam, 2011; Machokoto, Areneke and Ibrahim, 2020). Given that speakers of strong-FTR languages tend to exhibit lower risk aversion and lower future orientation (see Chen, 2013), we hypothesize that firms in strong-FTR countries may experience muted or even opposite effects—maintaining or increasing leverage and shortening maturities during crises.

The empirical results, presented in Columns (3) and (4) of Panels A and B of Table 7, support this hypothesis. The significant positive coefficient on the strong-FTR dummy corroborates our earlier findings—firms in strong-FTR countries exhibit systematically different financing behavior. The coefficient on the GFCrisis dummy for leverage is positive but not statistically significant in Columns (3) and (4) in Panel A of Table 7, suggesting that leverage was largely unaffected. This result aligns with Alves and Francisco (2015) and Iqbal and Kume (2014), but diverges from Demirgüç-Kunt et al. (2020). Additionally, consistent with Kahle and Stulz (2010) and Kahle and Stulz (2013), we find evidence that net debt issuance rose during the initial phase of the crisis. Importantly, we also find, in Columns (3) and (4) in Panel B of Table 7, that debt maturity increased significantly, consistent with Yazdanfar et al. (2019) and the theoretical prediction that firms avoid refinancing risk through longer-term debt during turbulent periods (Diamond, 1991).

More importantly, the interaction term strong-FTR×GFCrisis is positive and significant at the 1% level for leverage in Columns (3) and (4) in Panel A of Table 7, indicating that firms in strong-FTR countries increased their leverage during the financial crisis. This may reflect a myopic preference for debt over equity financing during uncertainty, potentially fueled by capital providers' reluctance to supply equity. The interaction term for debt maturity in Columns (3) and (4) in Panel B of Table 7 is negative and significant, implying a less pronounced increase in maturity in strong-FTR countries (strong-FTR+strong-FTR×GFCrisis). This is likely due to lenders' aversion to committing long-term funds to borrowers who are perceived as short-term-oriented.

Empirical support for these findings is found in González (2015), who report that the rise in leverage during the crisis was predominantly driven by countries such as Portugal, Chile, and Greece, which are classified in our study as having strong-FTR languages. Additionally, a survey of 1050 Chief Financial Officers (CFOs) across the USA, Europe, and Asia by Campello et al. (2010) provides evidence suggesting that firms strategically drew down on their lines of credit, anticipating potential restrictions by banks at the onset of the Global Financial Crisis. This precautionary behavior may have mitigated the expected decline in leverage, aligning with our observed patterns. Moral hazard might also explain our findings of an increase rather than a decrease in leverage, as firms anticipate government bailouts or other institutional safeguards that reduce the perceived risks associated with higher

Table 7
The impact of major events on the relationship between FTR-strength and debt financing.

Panel A: Total debt												
Events	Hong Kong handover		Global financial crisis		IFRS adoption			Board reforms				
Event types	Asian tigers	Asian crisis	GFCrisis	GFCExUSA	ALL-IFRS	IFRS-M	IFRS-NM	All reforms	Board Indep.	Audit Comm.	CEO Duality	Non-Board.
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Hong Kong	−0.0103	−0.0510***										
	(0.0079)	(0.0067)										
Post-1997	0.0263***	−0.0100**										
	(0.0067)	(0.0048)										
Hong Kong × Post-1997	−0.0196**	−0.0230***										
	(0.0086)	(0.0078)										
Strong-FTR			0.0101***	−0.0055***	0.0027**	−0.0057***	0.0036***	0.0386***	0.0489***	0.0513***	−0.0556***	0.0290***
			(0.0012)	(0.0013)	(0.0013)	(0.0019)	(0.0014)	(0.0016)	(0.0021)	(0.0019)	(0.0086)	(0.0020)
GFCrisis			0.0009	0.0014								
			(0.0010)	(0.0010)								
strong-FTR × GFCrisis			0.0043***	0.0105***								
			(0.0015)	(0.0017)								
Post-IFRS adoption					−0.0011	0.0029*	−0.0015					
					(0.0010)	(0.0016)	(0.0010)					
strong-FTR × Post-IFRS adoption					0.0077***	0.0052**	0.0072***					
					(0.0016)	(0.0022)	(0.0017)					
Post-Board reform								−0.0033***	0.0033**	−0.0085***	−0.0165***	0.0038**
								(0.0012)	(0.0017)	(0.0014)	(0.0027)	(0.0018)
Strong-FTR × Post-Board reform								−0.0187***	−0.0355***	−0.0242***	0.0172***	−0.0304***
								(0.0019)	(0.0025)	(0.0021)	(0.0036)	(0.0024)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Institutional quality controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cultural controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Religion controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No	No	No	No
# of observations	5441	9715	184,149	162,065	155,608	80,769	143,676	127,512	81,416	106,055	32,721	79,709
Adj.R^2	0.275	0.225	0.194	0.191	0.184	0.169	0.200	0.184	0.200	0.200	0.247	0.215

Panel B: Debt maturity												
Events	Hong Kong handover		Global financial crisis		IFRS adoption			Board reforms				
Event types	Asian tigers	Asian crisis	GFCrisis	GFCExUSA	ALL-IFRS	IFRS-M	IFRS-NM	All reforms	Board Indep.	Audit Comm.	CEO Duality	Non-Board.
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Hong Kong	0.0265**	0.0301***										
	(0.0115)	(0.0093)										
Post-1997	0.0369***	−0.0035										
	(0.0090)	(0.0058)										
Hong Kong × Post-1997	−0.0612***	−0.0513***										
	(0.0123)	(0.0106)										
Strong-FTR			0.0523***	0.0166***	0.0113***	−0.0049**	0.0090***	0.0937***	0.1050***	0.1077***	−0.1853***	0.0624***
			(0.0015)	(0.0016)	(0.0015)	(0.0023)	(0.0016)	(0.0019)	(0.0026)	(0.0024)	(0.0120)	(0.0025)
GFCrisis			0.0065***	0.0070***								
			(0.0011)	(0.0011)								
Strong-FTR × GFCrisis			−0.0141***	−0.0087***								
			(0.0019)	(0.0020)								
Post-IFRS adoption					0.0077***	0.0099***	0.0060***					
					(0.0011)	(0.0020)	(0.0011)					
Strong-FTR × Post-IFRS adoption					−0.0076***	−0.0069**	−0.0093***					
					(0.0019)	(0.0027)	(0.0020)					
Post-Board reform								−0.0021	0.0049**	−0.0076***	−0.0297***	0.0010
								(0.0013)	(0.0021)	(0.0015)	(0.0037)	(0.0022)
Strong-FTR × Post-Board reform								−0.0210***	−0.0491***	−0.0296***	0.0402***	−0.0334***
								(0.0023)	(0.0032)	(0.0026)	(0.0049)	(0.0031)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Institutional quality controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cultural controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Religion controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No	No	No	No
# of observations	5441	9715	184,149	162,065	155,608	80,769	143,676	127,512	81,416	106,055	32,721	79,709
Adj.R^2	0.301	0.273	0.239	0.251	0.262	0.234	0.272	0.227	0.227	0.242	0.332	0.220

The table presents estimation results of Eqs. (2a)—(2d). The dependent variables are TDA, the ratio of total debt to total assets, serving as a proxy for leverage, and LDTD, the proportion of long-term debt in total debt, capturing the debt maturity structure. The main independent variable is strong-FTR, a dummy equal to one for countries with a strong future time reference (FTR) languages, based on the linguistic classification by Chen et al. (2017). Control variables included in the models but not reported for brevity are as follows: Tobin's q, defined as the market value of equity plus total debt divided by total assets; Sales Growth, the year-on-year percentage change in total sales; ROA, return on assets; and Size, measured as the natural logarithm of total assets. Tangibility is the ratio of property, plant, and equipment to total assets. DEP, R&D, Capex, and Cash denote depreciation, research and development expenditures, capital expenditures, and cash holdings, respectively, each scaled by total assets. Hong Kong is a country dummy equal to one for firms based in Hong Kong. Post-1997 Hangover is a dummy equal to one from 1997 onward. GFCrisis is equal to one for the 2008—2009 period. Post-IFRS is a dummy equal to one starting from the year a country adopts IFRS. Post-Board is a dummy equal to one from the year a country implements mandatory board reforms. The difference-in-difference analyses restrict subsamples to five years before and after each event [−5, +5] to isolate the effect of the event from confounding factors. The full sample consists of 40,655 non-financial, non-utility firms (512,046 firm-year observations) obtained from Datastream, covering the period 1981—2019. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, based on robust standard errors reported in parentheses.

leverage (Brandao-Marques et al., 2020; Pernell & Jung, 2024; Poole, 2009). This risk-seeking tendency extends to creditors, who may also be more willing to extend debt financing, assuming that systemic interventions will prevent widespread defaults. Consequently, both firms and lenders become less sensitive to the long-term consequences of excessive debt accumulation, reinforcing the observed increase in leverage in strong-FTR countries (Acharya et al., 2017; Brandao-Marques et al., 2020; Pernell & Jung, 2024; Poole, 2009). Thus, FTR-strength emerges from our analysis as an important behavioral channel in understanding financing responses during systemic shocks.

4.4.1.3. The adoption of international financial reporting standards (IFRS). The adoption of International Financial Reporting Standards (IFRS) remains a contentious and extensively researched topic in the accounting and finance literature.[13] While proponents argue that IFRS adoption enhances the corporate information environment by improving comparability and transparency, a growing body of literature cautions that the discretion inherent in IFRS may enable firms to report lower-quality accounting information (Cameran et al., 2014). Such informational frictions could have implications for firms' capital structure decisions—specifically, their leverage (Myers & Majluf, 1984) and debt maturity profiles (Myers, 1977). Consequently, the net effect of IFRS adoption on

[13] See, among others, Agyei-Boapeah et al. (2020), Ahmed et al. (2013), Beneish et al. (2015), Brüggemann et al. (2013), Cameran et al. (2014), Daske et al. (2008), de Lima et al. (2018), dos Santos et al. (2016), Florou and Kosi (2015), Houqe et al. (2016) and Li et al. (2021).

corporate financing strategies is likely to be context-dependent, varying with the extent to which it enhances the information environment in a given country. To investigate this heterogeneity, we consider FTR-strength as a moderating institutional factor in our third quasi-natural experiment. Specifically, we examine whether the strength of future time reference (FTR) moderates the impact of IFRS adoption on corporate leverage and debt maturity.

The results are reported in Columns (5) to (7) of Panels A and B of Table 7, where we estimate Eq. (2c) for three variants: Full Sample IFRS Adoption (IFRS), Mandatory Adoption (IFRS-M), and Non-Mandatory Adoption (IFRS-NM). In Panel A (Columns 5—7), we find that post-IFRS adoption mostly has no statistically significant effect on leverage overall—except in the case of mandatory IFRS adoption (IFRS-M), where the effect becomes marginally significant (only at the 10% significance level). In contrast, Panel B (Columns 5—7) shows that post-IFRS adoption is associated with a consistently positive and statistically significant (at the 1% level) increase in debt maturity. This result supports the view that IFRS adoption improves transparency and reduces informational asymmetries, thereby lowering the monitoring need typically addressed through short-term debt.

Importantly, we find that the interaction term strong-FTR× PostIFRSAdoption is positive and significant at the 1% level in all specifications in Panel A of Table 7. This implies that leverage increases post-IFRS adoption, primarily in countries with strong-FTR languages. This result potentially reconciles the mixed findings in the literature (see Brüggemann et al., 2013; Daske et al., 2008; Houqe et al., 2016; Li et al., 2021), and is consistent with the hypothesis that IFRS adoption amplifies the short-termism induced by strong-FTR linguistic environments, thereby influencing capital structure decisions. Conversely, in Panel B of Table 7, the interaction term strong-FTR×PostIFRSAdoption is negative and significant at the 1% level across all specifications, indicating a significant reduction in long-term debt in strong-FTR countries following IFRS adoption. This finding suggests that in such countries, IFRS adoption may increase the perceived need for the disciplining role of short-term debt rather than reduce it.

Taken together, these results underscore the importance of linguistic and cultural context—specifically, FTR-strength—as a hitherto underexplored institutional moderator in the debate on the impact of IFRS adoption. Our findings contribute to the literature by offering a novel explanation for the inconclusive evidence on the corporate financing implications of IFRS adoption and by highlighting the interplay between global accounting standards and deep-rooted national institutions such as language structures.

4.4.1.4. The mandatory adoption of board reforms. Our final quasi-natural experiment investigates the effects of mandatory board reforms—including board independence, audit committee establishment, CEO duality restrictions, and non-board reforms—on corporate financing behavior. These reforms are designed to enhance internal governance mechanisms and strengthen shareholder oversight, with potential implications for firms' reliance on debt financing. The extant literature offers supporting evidence that board reforms can reduce agency costs and enhance monitoring, thereby reducing the need for debt—particularly short-term debt—as a disciplinary tool (see Bae et al., 2021; Fauver et al., 2017; Solarino & Boyd, 2023). Accordingly, we hypothesize that these reforms will strengthen shareholder oversight and reduce the need to use debt financing in general and short-term debt financing, particularly to monitor and discipline myopic managerial behavior. Furthermore, we expect these effects to be attenuated in countries with strong-FTR languages, where managerial myopia may render governance reforms less effective in substituting the monitoring role traditionally played by debt.

Our expectations are informed by prior studies showing reductions in leverage and increases in interest rate spreads following governance reforms, as boards partially substitute the monitoring role of lenders (Ben-Nasr et al., 2021). However, the impact of board reforms on access to finance is not unidirectional; improved governance may also enhance creditworthiness and facilitate access to long-term debt, leading to greater reliance on external financing (see Bae et al., 2021). Thus, the net effect of governance reforms on leverage remains theoretically ambiguous.

To empirically test these contrasting predictions, we estimate Eq. (2c) for the board reform subsample. Results are presented in Columns (8) to (12) of Panels A and B of Table 7. As a starting point, we observe that countries classified as strong-FTR exhibit consistently positive and statistically significant (at the 1% level) coefficients for both leverage and debt maturity—except in the subsample of countries implementing non-board reforms (Post-Non-Board). These findings are aligned with Hypotheses 1 and 2, confirming that firms in strong-FTR countries tend to rely more heavily on debt, particularly long-term debt.

Further, in Columns (8) of Panels A and B of Table 7, the coefficient of the PostBoardReforms dummy is negative and statistically significant (Coefficient = −0.0033, p-value = 0.0000), suggesting that mandatory board reforms reduce the role of debt—especially short-term debt—as a monitoring mechanism. Disaggregated analysis reveals that this negative association is primarily driven by reforms related to audit committees and CEO duality, both of which enter the regressions with negative and significant coefficients. These results are consistent with the interpretation that enhanced internal governance substitutes for the external discipline imposed by creditors.

However, not all board reforms yield the same effects. Reforms aimed at increasing board independence (Board Indep.) are associated with a positive and statistically significant effect on leverage (Coefficient = 0.0033, p-value = 0.0000), consistent with the argument that stronger boards may improve access to credit and thus increase external financing (Bae et al., 2021). Likewise, these reforms significantly increase debt maturity (Coefficient = 0.0049, p-value = 0.0000), suggesting that strengthened governance may allow firms to commit to longer-term financial obligations, in line with the substitution hypothesis (Tosun & Senbet, 2020). In contrast, reforms involving audit committees (Audit Comm.) and CEO duality (CEO Duality) are associated with shorter debt maturity structures, entering the debt maturity regressions with negative and significant coefficients—echoing prior findings that such governance enhancements may prompt boards to favor more flexible, shorter-term financing arrangements (Datta et al., 2021).

More importantly, the interaction term strong-FTR× Post-Board Reform is negative and statistically significant across regressions for both leverage and debt maturity—except in the case of CEO duality reforms. The negative interaction effect on leverage implies that the leverage-reducing impact of board reforms is more pronounced in strong-FTR countries, potentially due to the diminished role of debt as a disciplining device where managerial short-termism is culturally ingrained. Meanwhile, the negative interaction effect on debt maturity suggests a stronger preference for shorter-term debt structures in strong-FTR countries in the post-reform period, reinforcing the idea that linguistic-cultural factors shape firms' responses to governance changes.

Overall, these findings offer novel evidence that informal institutional dimensions—specifically, linguistic structures such as FTR-strength—can significantly moderate the impact of formal governance reforms on corporate financing decisions. This underscores the importance of integrating behavioral and cultural considerations into the design and evaluation of corporate governance regulations.

4.4.2. The effect of FTR-strength on the firm value-leverage nexus

Thus far, our analysis has shown that firms in countries with strong-FTR languages tend to exhibit higher leverage and longer debt maturities. This raises an important and underexplored question: what are the firm value implications of FTR-strength, and to what

extent does it shape the relationship between corporate financing patterns and firm valuation?

The theoretical literature offers conflicting perspectives on the relationship between corporate financial policy and firm value. On the one hand, signaling models and agency theory—particularly the agency conflict between shareholders and managers—suggest a positive relationship between leverage and firm value, as debt may serve as a disciplinary mechanism (Jensen, 1986; Leland & Pyle, 1977; Ross, 1977). On the other hand, studies focusing on the agency conflict between shareholders and debtholders predict a negative relationship, citing problems such as asset substitution and underinvestment (Jensen & Meckling, 1976; Myers, 1977). Similarly, there is no consensus in the literature on the firm value implications of debt maturity structure. Long-term debt may allow firms to undertake longer-horizon, productivity-enhancing investments with a reduced risk of premature liquidation, thereby enhancing value. However, short-term debt facilitates closer monitoring by lenders, which can also improve firm performance and value (Schiantarelli & Srivastava, 1997). Empirical evidence also suggests that the leverage—value and maturity—value relationships are contingent on institutional contexts (Weill, 2008).

Recent research in behavioral finance and cultural economics has begun to examine how linguistic structures—particularly future-time reference (FTR)—influence risk preferences. Speakers of `strong-FTR` languages are generally more inclined to take risks and are more forward-looking compared to speakers of `weak-FTR` languages (see Chen, 2013; Kim et al., 2020; Kong et al., 2022; Liang et al., 2018). This behavioral disposition has been linked to economic outcomes such as higher returns and more aggressive investment behavior. For instance, Zhang et al. (2023) finds that IPO underpricing is significantly higher in `weak-FTR` countries, while Ho (2024) documents that firms in these settings face greater stock price crash risk, which may lead investors to assign them lower valuations.

Despite these insights, we know very little about how language—especially `FTR-strength` as an informal institutional characteristic—affects the relationship between financing structure and firm value. To fill this gap, we propose and estimate the following empirical model:

$$\begin{aligned} y_{ijkt} = {} & \gamma_0 + \gamma_1 \texttt{strong-FTR}_k + \gamma_2 \text{LEV}_{ijkt-1} \\ & + \gamma_3 \texttt{strong-FTR}_k \times \text{LEV}_{ijkt-1} \\ & + \boldsymbol{\theta} \boldsymbol{Z}_{ijkt-1} + \eta_j + \eta_t + \xi_{ijkt} \end{aligned} \tag{3}$$

where `i`, `j`, `k`, and `t` index for firm, industry, country, and year, respectively. `y` captures the value of a firm and is proxied by `Tobin's q` [including proxies of long-term value of a firm calculated as the average `Tobin's q` for the periods $t+1$-$t+2$, $t+1$-$t+3$, $t+1$-$t+4$ and $t+1$-$t+5$].[14] Using these different proxies of long-term shareholder value helps ensure that the results are not driven by our selection of the forward window periods. γ_0 is a constant. γ_1, γ_2, γ_3 and $\boldsymbol{\theta}$ are coefficients to be estimated. `Strong-FTR` is a dummy variable that takes the value of one for firms operating in `strong-FTR` countries and zero otherwise. `LEV` captures corporate financing decisions. It is proxied by either a firm's total debt ratio (`TDA` — the ratio of total debt to total assets) or its debt maturity (`LDTD` — the ratio of long-term debt to total debt). $\boldsymbol{Z}_{ijkt}$ is a vector of lagged firm size (`Size`), sales growth (`Sales Growth`), tangibility (`Tangibility`), capital expenditure (`Capex`), cash holdings (`ΔCash`), research and development (`R&D`), legal institutions (`Legal Institutions`), political institutions (`Political Institutions`), economic institutions (`Economic Institutions`), power distance (`Power Distance`), masculinity (`Masculinity`), uncertainty avoidance (`Uncertainty Avoidance`), catholic (`Catholic`), GDP growth (`GDP growth`) and inflation (`Inflation`). η_j, η_z and η_t are industry and year-fixed effects, respectively. Finally, the error term is ξ_{ijkt}.

[14] Bena and Li (2014), Chan et al. (2001) and Machokoto, Gyimah et al. (2021) use a similar approach to capture long-run effects.

Table 8 presents the results of estimating Eq. (3). Columns (1)—(10) report the effects of leverage and debt maturity on firm value, as well as the main and interactive effects of `strong-FTR`. Across all specifications, `strong-FTR` has a statistically significant and positive effect (at the 1% level) on firm value in both the short term [`Tobin's` q_{t+1}] and the long run [`Tobin's` $q_{t+1;t+2}$ and `Tobin's` $q_{t+1;t+5}$]. These results are robust to the inclusion of a comprehensive set of controls from the literature (see Agyei-Boapeah et al., 2020; Fauver et al., 2017; Machokoto et al., 2022). They are also consistent with prior findings on the influence of language on IPO pricing and crash risk (Ho, 2024; Zhang et al., 2023), as well as with broader evidence that firms in English-speaking (and often `strong-FTR`) countries tend to take greater risks and achieve higher value (Holmstrom & Kaplan, 2003).

Leverage and debt maturity both exhibit negative and significant coefficients (at the 1% level) on firm value, again in both short-term [`Tobin's` q_{t+1}] and the long run [`Tobin's` $q_{t+1;t+2}$ and `Tobin's` $q_{t+1;t+5}$] specifications. Specifically, the estimated coefficients for leverage range from −0.3917 to −0.4538, while those for debt maturity range from −0.3398 to −0.3565. These results are robust, even after controlling for firm- and country-specific determinants of firm value. The inverse relationship that we observe between leverage and firm value is in alignment with the argument that the agency costs from the diverging interests between shareholders and debt holders could lead to asset substitution (Jensen & Meckling, 1976) and underinvestment (Myers, 1977) problems, which can destroy firm value. The negative influence of debt maturity on firm value is consistent with the notion that firms with long-term debt would not benefit from the stringent monitoring and control that would have come with short-term debt, which may reduce firm value (Schiantarelli & Srivastava, 1997). These findings are consistent with those reported by Fosu et al. (2016), González (2015), and Ho (2024).

Importantly, the interaction term `strong-FTR×TDA` is consistently negative and significant (1% level) in both the short run [`Tobin's` q_{t+1}] and long run [`Tobin's` $q_{t+1;t+2}$ and `Tobin's` $q_{t+1;t+5}$] speciations. These results suggest significant amplifying effects of `FTR-strength` and point to more pronounced concerns related to over-leveraging in countries with `strong-FTR`. However, the coefficients of the interaction terms, `strong-FTR×LDTD`, are consistently positive and significant at the 1% level in both the short run [`Tobin's` q_{t+1}] and the long run [`Tobin's` $q_{t+1;t+2}$ and `Tobin's` $q_{t+1;t+5}$]. These latter results suggest that the negative effect of debt maturity on firm value is attenuated in `strong-FTR` countries. This finding supports the narrative that in `strong-FTR` countries, relatively lax monitoring and control by financiers pose less of a concern.

Overall, these results reveal a significant moderating role for `FTR-strength` in shaping the financing—firm value relationship. Our findings support the view that the linguistic context—`via` the cognitive framing it induces—can help explain cross-country differences not only in corporate financing behavior but also in how such decisions are perceived and priced by investors.

5. Conclusion

Few studies have systematically examined the role of linguistic structures—specifically future time reference (FTR) strength—in shaping corporate financial decision-making. Our study is among the first to investigate how `FTR-strength` influences firms' leverage and debt maturity choices, as well as its moderating role in the context of financial crises, mandatory financial reporting reforms, and corporate governance interventions. Furthermore, we assess whether and how `FTR-strength` conditions the controversial relationship between financing structures and shareholder value.

Our results reveal that firms located in `strong-FTR` countries are more likely to employ higher levels of leverage and rely more heavily on long-term debt instruments. These findings are robust to a battery of

Table 8
The moderating effect of FTR-strength the relationship between firm value and financing decisions.

Dependent variables	Tobin'sq$_{t+1}$	Tobin'sq$_{t+1;t+2}$	Tobin'sq$_{t+1;t+3}$	Tobin'sq$_{t+1;t+4}$	Tobin'sq$_{t+1;t+5}$	Tobin'sq$_{t+1}$	Tobin'sq$_{t+1;t+2}$	Tobin'sq$_{t+1;t+3}$	Tobin'sq$_{t+1;t+4}$	Tobin'sq$_{t+1;t+5}$
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Strong-FTR	0.0906***	0.1117***	0.1117***	0.1119***	0.1127***	0.0530***	0.0688***	0.0667***	0.0646***	0.0638***
	(0.0062)	(0.0062)	(0.0059)	(0.0058)	(0.0057)	(0.0057)	(0.0056)	(0.0055)	(0.0053)	(0.0052)
TDA	−0.4459***	−0.4538***	−0.4387***	−0.4163***	−0.3917***					
	(0.0115)	(0.0113)	(0.0111)	(0.0109)	(0.0107)					
Strong-FTR × TDA	−0.1200***	−0.1738***	−0.1876***	−0.1956***	−0.2025***					
	(0.0170)	(0.0167)	(0.0163)	(0.0160)	(0.0157)					
LDTD						−0.3464***	−0.3565***	−0.3398***	−0.3159***	−0.2932***
						(0.0103)	(0.0101)	(0.0098)	(0.0097)	(0.0095)
Strong-FTR × LDTD						0.0986***	0.0765***	0.0695***	0.0672***	0.0637***
						(0.0135)	(0.0133)	(0.0129)	(0.0127)	(0.0125)
Size	0.0017***	0.0057***	0.0068***	0.0076***	0.0082***	0.0008	0.0049***	0.0058***	0.0065***	0.0070***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Sales growth	0.6430***	0.7617***	0.7409***	0.6702***	0.6228***	0.6523***	0.7714***	0.7503***	0.6790***	0.6311***
	(0.0092)	(0.0088)	(0.0084)	(0.0081)	(0.0078)	(0.0092)	(0.0088)	(0.0084)	(0.0081)	(0.0079)
Tangibility	−0.3581***	−0.3879***	−0.4298***	−0.4460***	−0.4450***	−0.3334***	−0.3618***	−0.4064***	−0.4269***	−0.4294***
	(0.0074)	(0.0073)	(0.0071)	(0.0069)	(0.0068)	(0.0077)	(0.0075)	(0.0073)	(0.0072)	(0.0071)
Capex	1.7806***	2.0775***	2.3498***	2.4419***	2.4188***	1.8404***	2.1440***	2.4154***	2.5058***	2.4804***
	(0.0314)	(0.0324)	(0.0322)	(0.0320)	(0.0316)	(0.0315)	(0.0325)	(0.0324)	(0.0321)	(0.0317)
Cash	1.1760***	1.1455***	1.1304***	1.1144***	1.1057***	1.3009***	1.2782***	1.2628***	1.2451***	1.2331***
	(0.0158)	(0.0155)	(0.0150)	(0.0146)	(0.0143)	(0.0154)	(0.0151)	(0.0146)	(0.0142)	(0.0140)
R&D	3.5284***	3.4827***	3.4250***	3.4093***	3.4157***	3.5820***	3.5408***	3.4857***	3.4728***	3.4809***
	(0.0696)	(0.0665)	(0.0635)	(0.0621)	(0.0613)	(0.0695)	(0.0663)	(0.0633)	(0.0619)	(0.0611)
Legal institutions	−0.4826***	−0.4464***	−0.3842***	−0.3083***	−0.2477***	−0.5895***	−0.5607***	−0.4982***	−0.4211***	−0.3580***
	(0.0445)	(0.0448)	(0.0438)	(0.0431)	(0.0426)	(0.0447)	(0.0451)	(0.0441)	(0.0434)	(0.0429)
Political institutions	−0.3584***	−0.3419***	−0.4608***	−0.5937***	−0.6977***	−0.2119***	−0.1849***	−0.3076***	−0.4471***	−0.5582***
	(0.0385)	(0.0384)	(0.0371)	(0.0362)	(0.0354)	(0.0389)	(0.0388)	(0.0376)	(0.0367)	(0.0359)
Economic institutions	−0.6933***	−0.7397***	−0.6772***	−0.6310***	−0.5918***	−0.6406***	−0.6832***	−0.6210***	−0.5757***	−0.5378***
	(0.0265)	(0.0265)	(0.0258)	(0.0253)	(0.0250)	(0.0266)	(0.0266)	(0.0258)	(0.0254)	(0.0251)
Power distance	−10.8656***	−10.7609***	−10.5642***	−10.3875***	−10.1656***	−10.9687***	−10.8808***	−10.6827***	−10.5012***	−10.2752***
	(0.1309)	(0.1287)	(0.1245)	(0.1218)	(0.1195)	(0.1313)	(0.1293)	(0.1251)	(0.1224)	(0.1201)
Masculinity	0.4976***	0.5271***	0.6536***	0.7314***	0.7968***	0.5098***	0.5783***	0.7116***	0.7903***	0.8567***
	(0.0813)	(0.0788)	(0.0762)	(0.0744)	(0.0728)	(0.0845)	(0.0818)	(0.0791)	(0.0772)	(0.0755)
Uncertainty avoidance	−5.4234***	−5.6280***	−5.5705***	−5.5603***	−5.5822***	−5.8219***	−6.0796***	−6.0070***	−5.9668***	−5.9613***
	(0.0844)	(0.0832)	(0.0807)	(0.0790)	(0.0777)	(0.0864)	(0.0852)	(0.0827)	(0.0809)	(0.0796)
Catholic	0.1983***	0.2031***	0.2005***	0.1987***	0.1968***	0.2069***	0.2122***	0.2089***	0.2059***	0.2031***
	(0.0041)	(0.0040)	(0.0039)	(0.0038)	(0.0038)	(0.0041)	(0.0041)	(0.0039)	(0.0039)	(0.0038)
GDP growth	1.8854***	1.8371***	1.6954***	1.4867***	1.2082***	1.7873***	1.7256***	1.5881***	1.3854***	1.1127***
	(0.0590)	(0.0568)	(0.0540)	(0.0537)	(0.0530)	(0.0593)	(0.0571)	(0.0543)	(0.0541)	(0.0534)
Inflation	−1.1752***	−1.3868***	−1.2555***	−1.1593***	−1.0965***	−1.0740***	−1.2680***	−1.1387***	−1.0466***	−0.9882***
	(0.0485)	(0.0524)	(0.0485)	(0.0476)	(0.0469)	(0.0481)	(0.0520)	(0.0482)	(0.0474)	(0.0468)
Constant	3.2295***	3.1554***	3.1181***	3.1060***	3.0925***	3.1518***	3.0738***	3.0405***	3.0348***	3.0276***
	(0.0258)	(0.0252)	(0.0243)	(0.0236)	(0.0232)	(0.0256)	(0.0250)	(0.0240)	(0.0234)	(0.0230)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	512,046	473,306	473,306	473,306	473,306	512,046	473,306	473,306	473,306	473,306
Adj.R^2	0.185	0.206	0.213	0.214	0.213	0.183	0.203	0.210	0.211	0.210

The table reports estimation results from Eq. (3). The dependent variable is Tobin's q, defined as the market value of equity plus total debt divided by total assets. The key independent variable is strong-FTR, a dummy equal to one for countries classified as having a strong future time reference (FTR) languages, following the linguistic categorization of Chen et al. (2017). TDA is the ratio of total debt to total assets, serving as a proxy for leverage. LDTD denotes the proportion of long-term debt in total debt, capturing the debt maturity structure. Control variables include: Size, measured as the natural logarithm of total assets; Sales Growth, the annual percentage change in total sales; and Tangibility, the ratio of property, plant, and equipment to total assets. Capex, Cash, and R&D represent capital expenditures, cash holdings, and research and development expenditures, respectively, each scaled by total assets. Legal institutions, Political institutions, and Economic institutions are composite indicators of institutional quality from Kunčič (2014). Cultural controls include Power distance, Masculinity, and Uncertainty avoidance, based on Hofstede (2001)'s cultural dimensions framework. Catholic is a binary variable equal to one if the majority of a country's population self-identifies as Catholic. GDP Growth is the annual growth rate of real gross domestic product, and Inflation is the annual percentage change in the consumer price index (CPI). The sample includes 40,655 non-financial, non-utility firms (512,046 firm-year observations) drawn from Datastream over the period 1981—2019. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, based on robust standard errors reported in parentheses.

sensitivity checks, including alternative model specifications, variable definitions, estimation techniques, subsample analyses, and controls for a wide array of firm-specific, institutional, cultural, religious, and macroeconomic factors, alongside multiple time-invariant and time-variant fixed effects. In addition, we find that FTR-strength significantly moderates the effects of exogenous shocks such as financial crises, IFRS adoption, and mandatory corporate governance reforms on leverage and debt maturity structures. Importantly, our analysis also indicates that while leverage is negatively associated with firm value, this negative effect is more pronounced in strong-FTR countries; in contrast, the adverse impact of debt with longer maturities on firm value is attenuated in such linguistic environments.

This study makes several novel contributions to the literature. First, it introduces FTR-strength as a previously overlooked but important informal institutional factor influencing capital structure and debt maturity decisions. By doing so, it expands the scope of inquiry in international finance and corporate governance to include linguistic and cultural dimensions of decision-making. Second, our analysis highlights that the effects of formal institutional reforms—such as IFRS adoption and corporate governance regulations—on financing behavior are contingent on the informal institutional context, particularly linguistic structures related to temporal framing. Third, we extend the literature on the determinants of firm value by demonstrating that the influence of financing activities on shareholder value varies systematically with the temporal structure of language, thereby reinforcing the argument that language shapes economic behavior in meaningful ways.

The implications of our findings are threefold. First, future research on capital structure, debt maturity, and firm valuation should more systematically incorporate informal institutions such as language, particularly FTR-strength, into theoretical and empirical models. Second, policymakers designing financial reporting and governance reforms should recognize that the effectiveness and consequences of such reforms are not uniform across countries; instead, they are moderated by the underlying linguistic and cultural context. In particular, interactions between formal institutional arrangements and informal linguistic features merit greater attention in regulatory impact assessments. Finally, our findings underscore the importance of exercising caution when interpreting cross-country evidence on the relationship between corporate financing patterns and firm value, as these relationships are conditional not only on observable formal institutions but also on deeper, often unobservable informal institutions such as language.

CRediT authorship contribution statement

Michael Machokoto: Conceptualization, Writing – original draft, Writing – review & editing, Methodology, Software programming, Formal analysis, Data curation, Visualization. **Tesfaye T. Lemma:** Conceptualization, Writing – original draft, Writing – review & editing, Validation. **Marvelous Kadzima:** Conceptualization, Supervision, Project administration, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Variable definitions

See Table A.1.

Appendix B. Summary statistics by country

See Table B.1.

Appendix C. Withing-country analysis of the effect of FTR-strength

See Table C.1.

Appendix D. Alternative window periods around major events

See Table D.1.

Appendix E. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.irfa.2025.104392.

Table A.1

Variables	Definitions
TDA	Total debt to total assets (leverage).
LDTD	Long-term debt to total debt (debt maturity).
LTDA	Long-term debt to total assets.
SDA	Short-term debt to total assets.
NDA	Net debt to total assets.
TLA	Total liabilities to total assets.
TDM	Total debt to market value.
LTDM	Long-term debt to market value.
SDM	Short-term debt to market value.
SDTD	Short-term debt to total debt.
Strong-FTR	The dummy for countries with Strong Future Time Reference (FTR) (see Chen et al., 2017).
Sentence ratio	The proportion of future weather sentences that contain a future marker (see Chen et al., 2017).
Verb ratio	Measures the proportion of future-marked verbs to the total number of future verbs (see Chen et al., 2017).
`Tobin's q`	Market value of equity plus debt to total assets.
Sales growth	The change in total sales.
ROA	Return on total assets.
Size	The logarithm of total assets.
Tangibility	Property, plant, and equipment to total assets.
DEP	Depreciation to total assets.
R&D	Research and development to total assets.
Capex	Physical capital expenditure to total assets.
Cash	Cash and cash equivalent to total assets.
Legal institutions	A composite index of the quality of a country's Legal institutions based on Kunčič (see 2014). This dataset is available from https://sites.google.com/site/aljazkuncic/.
Political institutions	A composite index of the quality of a country's Political institutions based on Kunčič (see 2014). This dataset is available from https://sites.google.com/site/aljazkuncic/.
Economic institutions	A composite index of the quality of a country's Economic institutions based on Kunčič (see 2014). This dataset is available from https://sites.google.com/site/aljazkuncic/.
Power distance	Hofstede's cultural dimension for Power distance (see Hofstede, 2001).
Masculinity	Hofstede's cultural dimension for masculinity (see Hofstede, 2001).
Uncertainty avoidance	Hofstede's cultural dimension for Uncertainty avoidance (see Hofstede, 2001).
Catholic	A dummy variable that takes the value of one if the majority of the country's population surveyed are Catholic and zero otherwise.
Christianity	A dummy variable that takes the value of one if a country has more than 50% of the population surveyed as Christians and zero otherwise.
GDP growth	The growth rate of real GDP.
Inflation	The inflation rate is based on the consumer price index (CPI).
PrivateCredit/GDP	Private credit to GDP.
StockMarketCap/GDP	Stock market capitalization to GDP

The table provides definitions of all variables used in the analysis. Firm-level variables are obtained from `Thomson Reuters Datastream`. Data on institutional quality, religion, and macroeconomic conditions are sourced from the World Bank (WBC) and academic studies, including Djankov et al. (2003), Djankov et al. (2008), La Porta et al. (1997), and Kunčič (2014). Cultural dimensions are based on Hofstede (2001), and `FTR-strength` is drawn from Chen et al. (2017).

Table B.1

#	Country	N	Firms	TDA	LDTD	LTDA	SDA	NDA	TLA	TDM	LTDM	SDM	SDTD	Strong-FTR	Verb ratio	Sentence ratio
(1)	Argentina	73	805	0.2884	0.3279	0.1831	0.1053	0.1972	0.5545	0.2608	0.1663	0.0945	0.1756	1		
(2)	Australia	472	4455	0.1623	0.2372	0.1148	0.0467	0.0245	0.4056	0.1433	0.0977	0.0450	0.1006	1	0.0009	0.0009
(3)	Austria	146	2153	0.2489	0.2600	0.1568	0.0921	0.1355	0.5976	0.2205	0.1387	0.0817	0.1521	0	0.0000	0.0000
(4)	Belgium	217	3198	0.2196	0.2746	0.1620	0.0576	0.1050	0.5714	0.1801	0.1333	0.0468	0.1040	0	0.0004	0.0004
(5)	Brazil	459	5200	0.3041	0.3402	0.1970	0.1069	0.1661	0.5450	0.3011	0.1912	0.1097	0.1922	0	0.0000	0.0000
(6)	Bulgaria	35	315	0.1768	0.2461	0.0999	0.0768	0.1283	0.3383	0.2091	0.1184	0.0907	0.1836	1		
(7)	Canada	730	7125	0.2165	0.3219	0.1673	0.0485	0.1153	0.4513	0.1959	0.1485	0.0464	0.0998	1	0.0008	0.0009
(8)	Chile	140	1875	0.2719	0.3872	0.1870	0.0849	0.1912	0.4697	0.2538	0.1702	0.0836	0.1764	1		
(9)	China	2397	24,831	0.2383	0.1135	0.0591	0.1785	0.0542	0.4496	0.1566	0.0421	0.1139	0.3640	0	0.0000	0.0000
(10)	Colombia	17	126	0.2400	0.4152	0.1970	0.0430	0.1881	0.4198	0.2122	0.1676	0.0446	0.1067	1	0.0716	0.0741
(11)	Croatia	45	410	0.2246	0.3550	0.1510	0.0736	0.1697	0.4059	0.2677	0.1819	0.0858	0.1680	1	0.0786	0.0786
(12)	Denmark	292	4525	0.2244	0.2805	0.1538	0.0705	0.0811	0.5143	0.1694	0.1170	0.0522	0.1295	0	0.0100	0.0100
(13)	Finland	304	5166	0.2496	0.3107	0.1741	0.0753	0.1287	0.5304	0.2253	0.1599	0.0654	0.1375	0	0.0000	0.0000
(14)	France	1793	27,183	0.2163	0.2278	0.1406	0.0751	0.0795	0.5993	0.1855	0.1192	0.0657	0.1222	1	0.0958	0.0958
(15)	Germany	1668	23,523	0.1922	0.1940	0.1200	0.0716	0.0542	0.5927	0.1607	0.0988	0.0611	0.1137	0	0.0000	0.0000
(16)	Greece	272	3141	0.3033	0.2336	0.1405	0.1626	0.2253	0.5468	0.3112	0.1413	0.1697	0.2905	1	0.0974	0.0974
(17)	Hong Kong	2465	26,855	0.1873	0.2013	0.0928	0.0941	−0.0248	0.4064	0.2029	0.0987	0.1035	0.2132	0	0.0000	0.0000
(18)	Hungary	51	836	0.2151	0.2686	0.1311	0.0840	0.1377	0.4209	0.2209	0.1260	0.0948	0.1677	1	0.0250	0.0250
(19)	India	783	8157	0.2694	0.2170	0.1337	0.1347	0.1891	0.5417	0.2612	0.1287	0.1316	0.2314	1	0.0010	0.0010
(20)	Indonesia	714	8609	0.2580	0.2676	0.1459	0.1114	0.1285	0.4772	0.2453	0.1380	0.1065	0.2153	0		
(21)	Ireland	85	1090	0.2940	0.3975	0.2496	0.0444	0.1298	0.5979	0.2087	0.1749	0.0338	0.0750	1	0.1000	0.1000
(22)	Israel	134	1437	0.1959	0.2075	0.1264	0.0696	−0.0322	0.4497	0.1613	0.1000	0.0613	0.1280	1	0.1000	0.1000
(23)	Italy	162	1854	0.2798	0.2480	0.1591	0.1207	0.1535	0.6026	0.2644	0.1493	0.1151	0.1939	1	0.0900	0.0900
(24)	Japan	4622	85,251	0.2198	0.1752	0.1063	0.1126	0.0299	0.5303	0.2076	0.0981	0.1086	0.1849	0	0.0000	0.0000
(25)	Korea, Rep.	1826	20,596	0.2422	0.1463	0.0773	0.1640	0.0919	0.4566	0.2538	0.0803	0.1727	0.3178	1	0.0822	0.0822
(26)	Lithuania	10	110	0.2900	0.2467	0.1315	0.1585	0.2593	0.4846	0.3147	0.1363	0.1784	0.3203	1	0.0932	0.0932
(27)	Malaysia	1102	13,434	0.2080	0.1914	0.0872	0.1200	0.0782	0.3929	0.2318	0.0938	0.1372	0.2652	0		
(28)	Mexico	462	7192	0.2597	0.3750	0.2011	0.0582	0.1653	0.4903	0.2312	0.1739	0.0571	0.1157	1	0.0004	0.0005
(29)	Netherlands	461	7624	0.2256	0.2662	0.1648	0.0603	0.1125	0.5943	0.1634	0.1195	0.0433	0.0982	0	0.0000	0.0000
(30)	New Zealand	137	1554	0.2589	0.4382	0.2090	0.0499	0.1858	0.4676	0.1989	0.1639	0.0350	0.0991	1	0.0008	0.0010
(31)	Norway	406	4879	0.3232	0.4402	0.2678	0.0553	0.2046	0.5723	0.3107	0.2570	0.0535	0.0944	0	0.0153	0.0153
(32)	Pakistan	178	1759	0.3307	0.2006	0.1258	0.2044	0.2657	0.5611	0.3503	0.1319	0.2180	0.3367	1	0.0007	0.0007
(33)	Peru	126	1337	0.1986	0.2681	0.1219	0.0767	0.1252	0.4049	0.1977	0.1150	0.0827	0.1865	1	0.0009	0.0009
(34)	Philippines	152	1699	0.2689	0.3245	0.1810	0.0878	0.1578	0.4857	0.2733	0.1808	0.0922	0.1736	1	0.0009	0.0009
(35)	Poland	253	2464	0.1806	0.1987	0.1026	0.0774	0.0787	0.4714	0.1846	0.1012	0.0827	0.1601	1	0.0282	0.0282
(36)	Portugal	69	872	0.4073	0.4431	0.3040	0.1032	0.3186	0.6890	0.3576	0.2653	0.0923	0.1425	1	0.0850	0.0850
(37)	Russia	277	2738	0.2175	0.2677	0.1381	0.0789	0.1248	0.4318	0.2363	0.1433	0.0921	0.1589	1	0.0722	0.0722
(38)	Singapore	1166	13,502	0.2049	0.2175	0.1034	0.1008	0.0333	0.4317	0.2171	0.1050	0.1113	0.2177	0	0.0009	0.0009
(39)	South Africa	539	7413	0.1588	0.1834	0.0966	0.0618	0.0383	0.4747	0.1294	0.0786	0.0502	0.1182	1	0.0009	0.0009
(40)	Spain	601	9125	0.2955	0.3367	0.2111	0.0840	0.1913	0.6007	0.2547	0.1841	0.0703	0.1504	1	0.0716	0.0716
(41)	Sweden	1091	16,288	0.2043	0.2390	0.1404	0.0637	0.0712	0.5418	0.1616	0.1111	0.0502	0.1095	0	0.0049	0.0049
(42)	Switzerland	688	12,227	0.2116	0.2613	0.1466	0.0647	0.0413	0.5166	0.1599	0.1123	0.0473	0.1224	0	0.0003	0.0003
(43)	Taiwan	1700	21,347	0.2021	0.1689	0.0778	0.1235	−0.0140	0.4082	0.1918	0.0727	0.1183	0.2679	0	0.0000	0.0000
(44)	Thailand	912	12,555	0.2765	0.2462	0.1348	0.1412	0.1714	0.4617	0.2530	0.1197	0.1327	0.2729	1		
(45)	Turkey	352	4306	0.2302	0.1931	0.1067	0.1230	0.1199	0.4770	0.2025	0.0942	0.1080	0.2336	1	0.0558	0.0558
(46)	United Kingdom	1940	23,890	0.1695	0.1991	0.1101	0.0588	0.0604	0.5164	0.1362	0.0865	0.0489	0.1094	1	0.0881	0.0881
(47)	United States	6216	77,015	0.2079	0.2997	0.1679	0.0391	0.0573	0.4726	0.1659	0.1323	0.0325	0.0764	1	0.0769	0.0769

The table presents summary statistics across the countries in the sample. The dependent variables include several proxies for leverage and debt maturity, defined as follows: TDA is the ratio of total debt to total assets, serving as a proxy for leverage; LDTD represents the proportion of long-term debt in total debt, capturing the debt maturity structure; LTDA and SDA are the ratios of long-term and short-term debt to total assets, respectively; NDA is net debt scaled by total assets; TLA denotes total liabilities to total assets; TDM, LTDM, and SDM measure total, long-term, and short-term debt relative to market value, respectively; SDTD represents the share of short-term debt in total debt. The main independent variable is `strong-FTR`, a dummy variable indicating countries with a strong future time reference (FTR), based on the linguistic classification by Chen et al. (2017). Other alternative independent variables include: `Sentence Ratio`, which measures the proportion of future-oriented weather forecast sentences that include an explicit future time marker, following the linguistic framework of Chen et al. (2017), and `Verb Ratio`, which measures the share of future-marked verbs relative to the total number of future-tense verb constructions, similarly drawing on the linguistic coding by Chen et al. (2017). The sample includes 40,655 non-financial, non-utility firms (512,046 firm-year observations) drawn from Datastream over the period 1981—2019. Variable definitions are in Appendix A.

Table C.1

Dependent variables	TDA	NDA	TLA	LDTD	LTDA	TDM	LTDM
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Strong-FTR	0.1443***	0.2164***	0.0847***	0.2111***	0.1210***	0.0944***	0.0763***
	(0.0269)	(0.0392)	(0.0284)	(0.0382)	(0.0256)	(0.0218)	(0.0205)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	211	211	211	211	211	211	211
Adj.R^2	0.229	0.308	0.188	0.348	0.235	0.443	0.381

The table presents the estimation results for Eq. (1). The dependent variables are several proxies for leverage and debt maturity, as follows: `TDA` represents the ratio of total debt to total assets, serving as a proxy for leverage; `NDA` is net debt scaled by total assets; `TLA` denotes total liabilities to total assets; `LDTD` is the proportion of long-term debt in total debt, capturing the debt maturity structure; `LTDA` is the ratio of long-term debt to total assets; `TDM` and `LTDM` measure total and long-term debt relative to market value, respectively. The main independent variable is `strong-FTR`, a dummy variable for countries with a strong future time reference (`FTR`), based on the linguistic classification by Chen et al. (2017). Control variables included in the models but not reported for brevity are as follows: `Tobin's q`, defined as the market value of equity plus total debt divided by total assets; `Sales Growth`, the year-on-year percentage change in total sales; `ROA`, return on total assets; and `Size`, the natural logarithm of total assets. `Tangibility` is the ratio of property, plant, and equipment to total assets. `DEP`, `R&D`, `Capex`, and `Cash` denote depreciation, research and development expenditures, capital expenditures, and cash holdings, respectively, each scaled by total assets. The sample consists of a propensity score-matched sample of 65 non-financial, non-utility firms (211 firm-year observations) in Switzerland, drawn from Datastream for the period 1981 to 2019. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, with robust standard errors reported in parentheses.

Table D.1

Panel A: Total debt												
Events	Hong Kong handover		Global financial crisis		IFRS adoption			Board reforms				
Event types	Asian tigers	Asian crisis	GFCrisis	GFCExUSA	ALL-IFRS	IFRS-M	IFRS-NM	All reforms	Board Indep.	Audit Comm.	CEO Duality	Non-Board.
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Hong Kong	−0.0012	−0.0445***										
	(0.0083)	(0.0070)										
Post-1997	0.0295***	−0.0101**										
	(0.0070)	(0.0051)										
Hong Kong × Post-1997	−0.0287***	−0.0225***										
	(0.0090)	(0.0081)										
Strong-FTR			0.0099***	−0.0055***	0.0024*	−0.0030	0.0027*	0.0373***	0.0437***	0.0482***	−0.0493***	0.0249***
			(0.0013)	(0.0015)	(0.0014)	(0.0021)	(0.0015)	(0.0017)	(0.0023)	(0.0021)	(0.0093)	(0.0022)
GFCrisis			0.0020*	0.0023**								
			(0.0010)	(0.0010)								
Strong-FTR × GFCrisis			0.0059***	0.0123***								
			(0.0016)	(0.0018)								
Post-IFRS adoption					−0.0015	0.0036**	−0.0019*					
					(0.0010)	(0.0017)	(0.0010)					
Strong-FTR × Post-IFRS adoption					0.0098***	0.0064***	0.0096***					
					(0.0017)	(0.0023)	(0.0019)					
Post-Board reform								−0.0029**	0.0009	−0.0084***	−0.0115***	0.0005
								(0.0013)	(0.0018)	(0.0015)	(0.0028)	(0.0020)
Strong-FTR × Post-Board reform								−0.0168***	−0.0304***	−0.0211***	0.0077**	−0.0233***
								(0.0020)	(0.0026)	(0.0023)	(0.0038)	(0.0026)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Institutional quality controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cultural controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Religion controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No	No	No	No
# of observations	4830	8626	160,531	141,664	137,033	70,911	126,682	112,442	71,268	93,598	29,329	69,769
Adj.R^2	0.278	0.220	0.198	0.196	0.186	0.173	0.201	0.184	0.201	0.200	0.250	0.218

Panel B: Debt maturity												
Events	Hong Kong handover		Global financial Crisis		IFRS adoption			Board reforms				
Event types	Asian tigers	Asian crisis	GFCrisis	GFCExUSA	ALL-IFRS	IFRS-M	IFRS-NM	All reforms	Board Indep.	Audit Comm.	CEO Duality	Non-Board.
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Hong Kong	0.0302**	0.0328***										
	(0.0122)	(0.0099)										
Post-1997	0.0440***	0.0016										
	(0.0094)	(0.0062)										
Hong Kong × Post-1997	−0.0706***	−0.0541***										
	(0.0129)	(0.0112)										
Strong-FTR			0.0504***	0.0161***	0.0117***	−0.0028	0.0092***	0.0925***	0.1019***	0.1080***	−0.1850***	0.0533***
			(0.0017)	(0.0018)	(0.0017)	(0.0026)	(0.0017)	(0.0021)	(0.0029)	(0.0026)	(0.0128)	(0.0028)
GFCrisis			0.0044***	0.0050***								
			(0.0012)	(0.0012)								
Strong-FTR × GFCrisis			−0.0106***	−0.0065***								
			(0.0020)	(0.0021)								
Post-IFRS adoption					0.0063***	0.0073***	0.0045***					
					(0.0011)	(0.0021)	(0.0011)					
Strong-FTR × Post-IFRS adoption					−0.0053***	−0.0044	−0.0069***					
					(0.0020)	(0.0029)	(0.0021)					
Post-Board reform								−0.0028*	0.0015	−0.0077***	−0.0241***	−0.0056**
								(0.0015)	(0.0022)	(0.0016)	(0.0039)	(0.0024)
Strong-FTR × Post-Board reform								−0.0140***	−0.0388***	−0.0208***	0.0358***	−0.0181***
								(0.0024)	(0.0034)	(0.0028)	(0.0052)	(0.0033)
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Institutional quality controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cultural controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Religion controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No	No	No	No
# of observations	4830	8626	160,531	141,664	137,033	70,911	126,682	112,442	71,268	93,598	29,329	69,769
Adj.R^2	0.309	0.268	0.241	0.254	0.262	0.237	0.272	0.231	0.234	0.246	0.327	0.229

The table presents the estimation results of Eqs. (2a)—(2d). The dependent variables are TDA, the ratio of total debt to total assets, which serves as a proxy for leverage, and LDTD, the proportion of long-term debt in total debt, which captures the debt maturity structure. The main independent variable is `strong-FTR`, a dummy variable indicating countries with a strong future time reference (FTR), as defined by the linguistic classification of Chen et al. (2017). The control variables included in the models but not reported for brevity are as follows: `Tobin's q`, defined as the market value of equity plus total debt divided by total assets; `Sales Growth`, the year-on-year percentage change in total sales; `ROA`, return on total assets; and `Size`, the natural logarithm of total assets. `Tangibility` is the ratio of property, plant, and equipment to total assets. `DEP`, `R&D`, `Capex`, and `Cash` represent depreciation, research and development expenditures, capital expenditures, and cash holdings, respectively, each scaled by total assets. `Hong Kong` is a country dummy variable equal to one for firms based in Hong Kong. `Post-1997` `Hangover` is a dummy variable equal to one for observations from 1997 onward. `GFCrisis` equals one for the period 2008—2009. `Post-IFRS` is a dummy variable equal to one from the year a country adopts IFRS. `Post-Board` equals one from the year a country implements mandatory board reforms. The difference-in-difference analyses restrict the subsamples to five years before and after each event [−4, +4] to isolate event-specific effects. The full sample includes 40,655 non-financial, non-utility firms (512,046 firm-year observations) from Datastream, covering the period 1981—2019. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, based on robust standard errors reported in parentheses.

Data availability

The authors do not have permission to share data.

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