

https://dspace.org/

Linguistic nuances and the valuation of corporate investments in innovation

Michael Machokoto; T Lemma; R Matemane

ACADEMIC PRESS INC ELSEVIER SCIENCE
https://hdl.handle.net/10539/47088
WOS

Downloaded from a DSpace repository. https://dspace.org/

Finance Research Letters 79 (2025) 107206

Contents lists available at ScienceDirect

Finance Research Letters

journal homepage: www.elsevier.com/locate/frl

Linguistic nuances and the valuation of corporate investments in innovation

Michael Machokoto [a,b], Tesfaye T. Lemma [c,*], Reon Matemane [d]

[a] African Development Bank Group, Avenue Joseph Anoma, Abidjan, Côte d'Ivoire
[b] Department of Financial Governance, College of Accounting Sciences, University of South Africa, Pretoria, South Africa
[c] College of Business and Economics, Towson University, 8000 York Road, Towson, MD, USA
[d] Department of Financial Management, University of Pretoria, Pretoria, South Africa

ARTICLE INFO

JEL classification:
G01
G31
G32

Keywords:
Innovation
Languages
Agency conflicts
Firm performance
Firm value

ABSTRACT

Based on data drawn from 45 countries covering the period 1981–2019, we explore whether and how future time reference in languages (FTR) influences the relationship between corporate innovation investments and firm value. We find a positive association between corporate investments in innovation and firm value, with this association being more pronounced for firms in weak-FTR countries. These findings are robust to various concerns and provide novel insights into the role of language, an informal institution, in shaping the relevance and valuations of corporate decisions by capital markets. The findings underscore the necessity of accounting for not only formal institutional frameworks but also informal sociocultural factors in shaping the capital market dynamics of shareholder value — an aspect that has thus far received limited attention compared to the focus on formal institutions in extant literature.

1. Introduction

This study examines how future time reference (FTR) in languages shapes capital markets' valuations of innovation investments. Corporate innovation investments are important drivers of societal advancement and sustainable development and have attracted widespread attention from scholars, practitioners, and policymakers (Machokoto et al., 2021b, 2023). Understanding the mechanisms underlying the association between these innovation investments and corporate performance is imperative for optimizing their developmental impact (Alam et al., 2020) and informing strategic decision-making (Chen et al., 2017b). However, existing literature presents conflicting predictions regarding this important relationship. While enhanced productivity, growth, and competitive advantages stemming from corporate innovation investments are expected to bolster firm valuation (Hall, 1993, 2005; Lev, 1999), uncertainties surrounding the outcomes of such investments may lead firms to either underinvest in value-enhancing projects or overinvest in non-value-adding innovation initiatives (Hill and Snell, 1988; Chen et al., 2017b). Moreover, corporate innovation investments are often linked to more opaque information, which may create significant information asymmetry between insiders and outsiders (Aboody and Lev, 2000; Keupp and Gassmann, 2009; Block, 2012), potentially diminishing firm value.

Although several studies document a positive association between corporate innovation investments and firm valuation (Hall, 1993, 2005; Ritter and Wells, 2006; Tong and Zhang, 2014), other studies find no significant relationship (Chan et al., 2001). Additionally, investors' valuation of corporate innovation investments is influenced by various firm-, industry-, and country-level characteristics (Pindado et al., 2015; Alam et al., 2020; Blundell et al., 1999; Lev, 1999). Recent research has focused on

* Corresponding author.
E-mail addresses: m.machokoto@afdb.org (M. Machokoto), tlemma@towson.edu (T.T. Lemma), reon.matemane@up.ac.za (R. Matemane).

https://doi.org/10.1016/j.frl.2025.107206
Received 3 June 2024; Received in revised form 14 February 2025; Accepted 13 March 2025
Available online 25 March 2025
1544-6123/© 2025 Elsevier Inc. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

understanding how country-level factors shape the valuation of corporate innovation investments (see Alam et al., 2020; Hill and Snell, 1988; Pindado et al., 2015; Chu et al., 2016), primarily emphasizing the role of formal institutions while largely overlooking the impact of informal institutions, such as language, and the role of FTR within languages. Our study aims to fill this gap by investigating how FTR in languages spoken by investors shapes the valuation of innovation investments.

An emerging body of research highlights how the language individuals speak shapes their perceptions and understanding of the future (Chen, 2013).[1] These studies indicate that some languages classified as strong future-time reference (strong-FTR) languages grammatically distinguish the future from the present. Speakers of strong-FTR languages often perceive the future as more distant and less relevant when making decisions within the current context. In contrast, weak future-time reference (weak-FTR) languages do not grammatically separate the future from the present, leading speakers to view the future as closer and more imminent (Dahl, 2008; Thieroff, 2008). Thus, speakers of weak-FTR languages are more likely to value the future benefits from corporate innovation investments, perceiving them as less distant. Conversely, speakers of strong-FTR languages, perceiving such benefits as more remote, are likely to discount them heavily (Frederick et al., 2002), and therefore, are less inclined to assign higher values to firms that invest in innovation.

Furthermore, the language an individual speaks can influence their temporal orientation (He and Zhang, 2022; Nishikawa et al., 2023). Speakers of weak-FTR languages tend to exhibit a stronger long-term orientation than those who speak strong-FTR languages (Chen, 2013; Hechavarrá et al., 2023). Since corporate innovation investments are typically long-term endeavors (Alam et al., 2020; Pindado et al., 2015), investors in weak-FTR countries are more likely to assign higher value to firms that invest in innovation. Conversely, speakers of strong-FTR languages are generally inclined to take more risk (Osei-Tutu and Weill, 2021). Thus, while corporate innovation investments carry inherent risks (Alam et al., 2020; Pindado et al., 2015), speakers of strong-FTR languages may perceive potential losses from such ventures as distant and less immediate (Osei-Tutu and Weill, 2021). This perception could lead investors in countries with strong-FTR to assign a higher value to firms with innovation investments. Thus, the relationship between the FTR in languages and the valuation of corporate innovation investments remains an open empirical question.

Analyzing data from 45 countries spanning 1981 to 2019, we find a positive association between corporate innovation investments and firm value, with this association being more pronounced in weak-FTR countries. This indicates that the country's language structure — specifically, whether the language is classified as strong-FTR or weak-FTR — plays a role in shaping how investors value corporate innovation investments. The findings hold across both the short- and long-term horizons, consistent with the extended gestation period typical of corporate innovation investments. Furthermore, after addressing various concerns, the results remain robust and withstand a falsification test, randomly assigning firms to the weak-FTR and strong-FTR subgroups.

Our study contributes to the discourse on the valuation of corporate innovation investments by emphasizing the role of FTR in languages. By examining the relationship between FTR in languages and the appraisal of a firm's innovation investments in capital markets, our study provides new insights into the interplay between language and the valuation of corporate innovation investments. Moreover, our study offers novel insights into the influence of informal, such as languages, on the relevance of corporate decisions in valuation contexts. These insights underscore the importance of considering not only formal institutional frameworks but also informal sociocultural factors in shaping capital market dynamics. Thus far, this dimension has received scant attention in the literature vis-à-vis formal institutions.

2. Methodology

To examine the effects of FTR in different languages on the valuation of corporate innovation investments, we estimate the following empirical model:

$$y_{ijkt} = \gamma_0 + \gamma_1 RD/TA_{ijkt-1} + \gamma_2 weak - FTR_k + \gamma_3 RD/TA_{ijkt-1} \times weak - FTR_k + \boldsymbol{\theta} \boldsymbol{X}_{ijkt-1} + \eta_j + \eta_t + \xi_{ijkt} \quad (1)$$

where i, j, k, and t are indices for firms, industries, countries, and years, respectively. y is a proxy for the measures of firm value in the short and long run. To measure firm value, we use the market value of equity *plus* total debt to total assets (Tobin's q — Q) in the short-run and the averages of Tobin's q for different periods in the long-run.[2] γ_0 is constant. γ_1, γ_2, γ_3 and $\boldsymbol{\theta}$ are the coefficients to be estimated. We define our primary independent variable as the language of the firm's country of domicile, which we assume to be the firm's operational language. Specifically, we construct a binary variable, *Weak-FTR*, set to one for firms in countries classified as *weak-FTR* (future time reference), and zero otherwise. This categorization captures the underlying linguistic structure associated with future tense, following prior studies highlighting the influence of weak or strong future time reference on economic behavior (Chen, 2013).[3] $\boldsymbol{X}_{ijkt}$ is a vector of the lagged firm- and country-specific control variables defined in Appendix

[1] See, among others, Alshehabi et al. (2023), Chen et al. (2017a), Chi et al. (2020), Fasan et al. (2016), He and Zhang (2022), Kim et al. (2017), Kong et al. (2022), Liang et al. (2018), and Na and Yan (2022).

[2] We also use the average Tobin's q for the periods $t+1$ and $t+3$ $[t+1;t+3]$ and $t+1$ and $t+5$ $[t+1;t+5]$. Using these other proxies enables us to gauge the robustness of our findings and, more importantly, to examine the effects of FTR in languages on the valuation of innovation in the long run. This approach to capturing long-run effects is in line with extant literature (see Bena and Li, 2014; Chan et al., 2001).

[3] To further validate our findings, we incorporate two alternative language-based metrics: the "sentence ratio" and the "verb ratio". The "sentence ratio" measures the proportion of future-oriented sentences in weather forecasts that include a future marker, indicating how strongly a language distinguishes the future from the present. Similarly, the "verb ratio" captures the proportion of future-marked verbs relative to all future verbs, assessing the grammatical emphasis placed on the future tense. These metrics, sourced from Chen (2013), offer a more granular analysis of the role of language in future-oriented cognition, reinforcing the robustness of our language variable's effect on firm behavior. These linguistic measures were used to triangulate the findings, supporting our hypothesis on the influence of language on risk and decision-making processes.

A.1 in the Online Appendix.[4] η_j and η_t are industry and year fixed effects, respectively. Finally, ξ_{ijkt} denotes the error term.

3. Data

The firm-level data required for the study were drawn from Thompson Reuters Datastream, and those pertaining to macroeconomic and institutional factors were obtained from the World Bank and prior research (see Kunčič, 2014; Hofstede, 2001; Djankov et al., 2003, 2008; Chen, 2013; La Porta et al., 1997). Consistent with the prior literature (Machokoto et al., 2021a, 2022, 2023), we exclude observations drawn from regulated sectors, firms with missing observations pertaining to key study variables, and firms with asset or sales growth rates greater than 100%. We winsorize all continuous variables included in the model at the upper and lower one percentiles of the distribution to address outliers. The final sample consists of 42,082 firms (567,317 firm–year observations) drawn from 45 countries, spanning from 1981 to 2019.[5]

4. Results and discussions

Table 1 presents the results estimating slightly varying versions of Eq. (1). Consistent with the view that increases in productivity, growth, and competitive advantage arising from corporate innovation investments would increase firm value (Hall, 1993, 2005; Lev, 1999), Column (1) shows a positive and significant coefficient (i.e., *coefficient* = 5.0480; $p < 0.01$) for the RD/TA variable. Column (1) also shows that the coefficient of weak-FTR is negative and significant (i.e., *coefficient* = −0.0574; $p < 0.01$), suggesting that firms in weak-FTR countries, on average, have lower market valuations than those in strong-FTR countries. The observed negative association between the *weak-FTR* and *Tobin's q* variables is broadly consistent with the literature on future time reference in languages and corporate dividend policies. Prior studies, such as He and Zhang (2022) and Nishikawa et al. (2023), find that firms in weak-FTR countries tend to pay lower dividends than their peers in strong-FTR countries, which may lead to lower valuation of firms in weak-FTR countries.

Interestingly, the result in Column 1 of Table 1 also indicates that the interaction term, *RD/TA* × *weak-FTR*, has a positive and significant coefficient (i.e., *coefficient* = 0.9090; $p < 0.01$). This suggests that the positive association between firm value and corporate innovation investments is more pronounced for firms in weak-FTR countries than those in strong-FTR countries. Firms with higher corporate innovation investments, which typically involve long-term projects with uncertain outcomes, are valued more highly in weak-FTR countries. This finding aligns with the observations of both Chen (2013) and Hechavarrá et al. (2023), who noted that speakers of weak-FTR languages tend to exhibit a stronger long-term orientation than their counterparts in strong-FTR countries.

In addition to the variables of interest included in Column (1), we progressively controlled for firm- and country-specific control variables to address the potential concern that our results might be biased due to variables omitted from our models. Columns (2)–(6) of Table 1 present the results based on models with control variables that include firm-specific factors, macroeconomic variables, and indicators of institutional quality, culture, and religion (Parhankangas and Renko, 2017; Singhal and Kapur, 2023). The results reported in these columns corroborate our earlier observation that the positive association between innovation and firm value is stronger in weak-FTR countries. Once again, our findings suggest that corporate investments in innovation are more highly valued in firms located in weak-FTR countries than in their peers in strong-FTR countries.

We further assess the robustness of our findings in relation to alternative measures of FTR in languages. To this end, we use *verb* and *sentence ratios* in languages, which are widely considered reverse proxies of FTR in languages (Chen, 2013; Chi et al., 2020; Kim et al., 2017; Kong et al., 2022). The results of re-estimating Eq. (1) using these alternative proxies of FTR in languages are reported in Columns (1) and (2) of Panel A in Table 2. Both the interaction terms, *RD/TA* × *Verb Ratio* and *RD/TA* × *Sentence Ratio*, have negative significant coefficients, suggesting that the association between investment in innovation and firm value is dampened in languages with higher grammatically future-marked *verb* and *sentence ratios*. This finding is consistent with our observations in the main analysis that the positive association between firm value and innovation is more pronounced in countries with weak FTR languages. To address the concern that missing R&D information does not necessarily represent a lack of innovative activities in a firm, because some firms may choose not to report R&D as a separate line item (Koh and Reeb, 2015; Canace et al., 2022), we use R&D plus selling, general, and administrative expenses (RDSGA/TA) (Machokoto et al., 2021b) and imputed R&D (IMRD/TA) as alternative measures of corporate innovation investments. Columns (3) and (4) of Panel A present the results based on the alternative proxies of innovation in Table 2. We report the results of our investigation into the impact of using alternative measures of firm value on our findings in Columns (5) to (7) of Panel A in Table 2.[6] All results confirm that innovation is positively associated with firm value and that the association is more pronounced in weak-FTR contexts.

[4] These include sales growth (*Sales Growth*), capital expenditure (*CAPEX*), cash holdings (*ΔCash*), research and development (*RD/TA*), long-term debt, short-term debt, property, plant and equipment (*PPE*), size (*Size*), legal institutions (*Legal Institutions*), political institutions (*Political Institutions*), economic institutions (*Economic Institutions*), power distance (*Power Distance*), masculinity (*Masculinity*), uncertainty avoidance (*Uncertainty Avoidance*), Catholicism (*Catholicism*), GDP growth (*GDP growth*) and inflation (*Inflation*).

[5] Appendices A.2, A.3 and A.4 in the Online Appendix present the summary statistics, sample distribution across countries, and correlations, respectively.

[6] We employ several alternative proxies for firm value, including the average of Tobin's q between time t and $t+3$ ($Q_{t:t+3}$), the average of Tobin's q between time t and $t+5$ ($Q_{t:t+5}$), and the market value to equity (QE).

Table 1
The effects of FTR in languages.

Dependent variables	Q	Q	Q	Q	Q	Q
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
RD/TA	5.0480***	3.3502***	3.4620***	3.4856***	3.3335***	3.3566***
	(0.0780)	(0.0766)	(0.0765)	(0.0771)	(0.0768)	(0.0769)
weak-FTR	−0.0574***	−0.0507***	−0.0655***	−0.0878***	−0.0722***	−0.0701***
	(0.0032)	(0.0032)	(0.0031)	(0.0033)	(0.0034)	(0.0034)
RD/TA × weak-FTR	0.9090***	1.9086***	1.9093***	2.0274***	1.8367***	1.7695***
	(0.1626)	(0.1605)	(0.1609)	(0.1628)	(0.1606)	(0.1603)
Sales growth		0.7127***	0.6609***	0.6474***	0.6268***	0.6244***
		(0.0089)	(0.0089)	(0.0089)	(0.0088)	(0.0088)
Size		−0.0338***	−0.0360***	−0.0413***	−0.0261***	−0.0222***
		(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0006)
AGE		−0.0212***	0.0251***	0.0485***	0.0241***	0.0145***
		(0.0024)	(0.0025)	(0.0026)	(0.0026)	(0.0026)
Cash		0.8828***	0.8323***	0.8026***	0.8696***	0.8843***
		(0.0154)	(0.0153)	(0.0154)	(0.0156)	(0.0156)
PPE		−0.5229***	−0.5697***	−0.5715***	−0.5762***	−0.5622***
		(0.0078)	(0.0078)	(0.0077)	(0.0077)	(0.0077)
TDA		−0.3767***	−0.3668***	−0.3815***	−0.3775***	−0.3894***
		(0.0084)	(0.0083)	(0.0084)	(0.0084)	(0.0084)
Capex		1.9785***	1.8726***	1.8343***	1.6232***	1.5960***
		(0.0300)	(0.0299)	(0.0297)	(0.0297)	(0.0297)
NWCCA		−0.6569***	−0.7254***	−0.7724***	−0.7547***	−0.7259***
		(0.0095)	(0.0095)	(0.0096)	(0.0097)	(0.0097)
GDP growth			3.6222***	2.4847***	2.0493***	2.1700***
			(0.0537)	(0.0555)	(0.0563)	(0.0564)
Inflation			−0.0441***	−0.0941***	−0.1122***	−0.1131***
			(0.0055)	(0.0126)	(0.0178)	(0.0173)
Legal institutions				1.3028***	0.0832*	0.2943***
				(0.0400)	(0.0426)	(0.0439)
Political institutions				−1.0359***	−0.5689***	−0.8040***
				(0.0347)	(0.0425)	(0.0457)
Economic institutions				−0.8432***	−0.7203***	−0.7290***
				(0.0221)	(0.0262)	(0.0262)
Power distance					−0.0076***	−0.0085***
					(0.0001)	(0.0002)
Masculinity					0.0003***	0.0008***
					(0.0001)	(0.0001)
Uncertainty avoidance					−0.0031***	−0.0034***
					(0.0001)	(0.0001)
Catholicism						0.0932***
						(0.0039)
Constant	1.4443***	2.0537***	1.9058***	2.3410***	3.2762***	3.2672***
	(0.0021)	(0.0105)	(0.0106)	(0.0171)	(0.0232)	(0.0232)
Industry FE	✔	✔	✔	✔	✔	✔
Year FE	✔	✔	✔	✔	✔	✔
N	567,317	567,317	567,317	567,317	567,317	567,317
Adj.R^2	0.090	0.165	0.173	0.178	0.188	0.189

***, **, * indicate significance at the one, five, and ten percent levels, respectively.

Next, in Columns (8) and (9) of Panel A in Table 2, we address the concern that our results might be driven by a few large economies with a disproportionately large number of observations using weighted regressions.[7] In Columns (10) and (11) of Panel A in Table 2, we include industry–country–year (IND–FIC–YR) and country–year (FIC–YR) fixed effects in our models to address the omitted variable bias. Additionally, we use propensity score matching (PSM) in Column (12) of Panel A in Table 2 to closely match each firm located in a *weak-FTR* country with a firm located in a *strong-FTR* country based on the covariates that were used as control variables in Eq. (1). This approach ensures that pre-existing differences in firm attributes unrelated to the FTR in languages do not drive the results we observed. We note that our results hold for this set of robustness tests.

Finally, we assessed the robustness of our findings across various subsamples, including different periods, industry sectors, and country classifications (excluding multilingual, Confucian, and dominant countries). Columns (1)–(11) of Panel B in Table 2, tabulating these additional analyses, consistently support the robustness of our main findings across subsamples. Furthermore, we conduct a falsification test (randomly assigning firms to the weak-FTR and strong-FTR groups) in Column (12) of Panel B in Table 2

[7] The weight is either the inverse of the number of observations for each country (WLS1) or the inverse of the square root of the number of observations for each country (WLS2).

Table 2
Additional analyses.

Panel A												
	Alternative variable definitions							WLS1	WLS2	IND–FIC–YR	FIC–YR	Matched
Dependent variables	Q	Q	Q	Q	$Q_{t:t+3}$	$Q_{t:t+5}$	QE	Q	Q	Q	Q	Q
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RD/TA	4.9048***	4.9047***			3.5130***	3.5290***	6.9297***	3.3521***	2.4715***	3.2516***	9.9213***	3.4968***
	(0.1336)	(0.1336)			(0.0796)	(0.0828)	(0.1891)	(0.0914)	(0.3031)	(0.9086)	(1.7997)	(0.0931)
Verb ratio	0.0891***											
	(0.0042)											
RD/TA × Verb ratio	−1.9162***											
	(0.1831)											
Sentence ratio		0.0889***										
		(0.0042)										
RD/TA × Sentence ratio		−1.9155***										
		(0.1832)										
RDSGA/TA			0.6526***									
			(0.0118)									
weak-FTR			−0.0660***	−0.0702***	−0.0859***	−0.0991***	−0.0888***	−0.0622***	−0.0991***	−0.0448**	−0.0429	−0.0833***
			(0.0039)	(0.0034)	(0.0034)	(0.0035)	(0.0086)	(0.0044)	(0.0157)	(0.0183)	(0.0396)	(0.0039)
RDSGA/TA × weak-FTR			0.1494***									
			(0.0196)									
IMRD/TA				3.3626***								
				(0.0770)								
weak-FTR × IMRD/TA				1.7908***								
				(0.1608)								
RD/TA × weak-FTR					1.9387***	2.0430***	2.7366***	2.7720***	4.2777***	2.9426***	7.4453***	1.6024***
					(0.1587)	(0.1662)	(0.3371)	(0.2350)	(0.3750)	(1.0246)	(2.2949)	(0.1935)
Control variables	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Industry FE	✔	✔	✔	✔	✔	✔	✔	✔	✔	✘	✘	✔
Year FE	✔	✔	✔	✔	✔	✔	✔	✔	✔	✘	✘	✔
Industry–country–year FE	✘	✘	✘	✘	✘	✘	✘	✘	✘	✔	✘	✘
Country–year FE	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘	✔	✘
N	567,280	567,280	567,280	567,280	483,094	398,919	567,280	567,280	567,280	10,520	1,404	377,404
Adj.R^2	0.189	0.189	0.189	0.189	0.188	0.196	0.113	0.175	0.164	0.242	0.362	0.192
Panel B												
	1980s	1990s	2000s	2010s	Pre-Crisis	Crisis	MAN	NON-MAN	Ex.Mult	Ex.Confucian	Ex.USA.JPN	Pseudo
Dependent variables	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RD/TA	1.6592***	4.3416***	2.9757***	2.8794***	3.0566***	1.7658***	3.2301***	3.3503***	3.0516***	2.7358***	3.3566***	4.0022***
	(0.2101)	(0.2201)	(0.1200)	(0.1193)	(0.1512)	(0.1251)	(0.1709)	(0.0851)	(0.0799)	(0.0811)	(0.0769)	(0.0953)
weak-FTR	−0.0509***	−0.1266***	−0.0901***	−0.1115***	−0.1534***	−0.1018***	−0.0705***	−0.0675***	0.0391***	−0.1008***	−0.0701***	−0.0007
	(0.0125)	(0.0073)	(0.0056)	(0.0061)	(0.0075)	(0.0064)	(0.0053)	(0.0043)	(0.0042)	(0.0058)	(0.0034)	(0.0028)
RD/TA × weak-FTR	−2.2368***	1.2755***	2.2898***	2.7947***	2.3756***	1.1978***	1.8863***	1.7264***	1.6438***	2.8816***	1.7695***	0.0970
	(0.2652)	(0.4142)	(0.3046)	(0.2191)	(0.4325)	(0.1856)	(0.2699)	(0.1821)	(0.1844)	(0.2155)	(0.1603)	(0.1392)
Control variables	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Industry FE	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Year FE	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
N	38,639	102,418	193,341	232,919	116,962	116,781	160,593	406,724	490,214	353,518	567,317	567,317
Adj.R^2	0.225	0.195	0.199	0.223	0.208	0.205	0.134	0.201	0.200	0.200	0.189	0.188

***, **, * indicate significance at the one, five, and ten percent levels, respectively.

to validate our model specifications. As expected, we find that the coefficients for weak-FTR and its interaction with RD/TA, RD/TA × weak-FTR, are indistinguishable from zero, confirming the robustness of our main results. Appendix A.5 in the Online Appendix also shows that our results hold for alternative variable definitions and when estimating our model using two-stage least squares (2SLS) regressions to address potential endogeneity concerns.[8,9]

5. Conclusion

This study examines the relationship between future time reference (FTR) in different languages and the valuation of corporate innovation investments. Using a comprehensive firm-level dataset from 45 countries spanning 1981 to 2019, we find robust evidence that corporate innovation investments are valued more highly by capital markets for firms domiciled in weak FTR countries. Our findings suggest that a country's language structure — specifically whether the language is classified as strong-FTR or weak-FTR — shapes investors' valuation of corporate innovation. These results highlight the importance of considering informal institutions such as language when studying the antecedents of corporate valuation. Managers in weak-FTR countries could boost firm value by increasing innovation engagement, while policymakers and regulators in these countries may leverage the strong link between innovation and firm value to encourage further investment in innovation. However, this study focuses solely on R&D investments, critical inputs for corporate innovation outcomes. Future research exploring innovation processes and outcomes may provide further insights.

CRediT authorship contribution statement

Michael Machokoto: Methodology, Investigation, Formal analysis. **Tesfaye T. Lemma:** Writing – review & editing, Writing – original draft, Supervision. **Reon Matemane:** Supervision, Resources, Project administration, Conceptualization.

Disclaimer statement

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any organization with which the authors are affiliated. All errors remain ours.

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.

Acknowledgments

We gratefully acknowledge the helpful comments and suggestions from the editor and anonymous reviewers.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.frl.2025.107206.

Data availability

The authors do not have permission to share data.

[8] To mitigate potential endogeneity concerns, we adopt a 2SLS regression approach, as recommended by Nason and Patel (2016). The 2SLS regression involves instrumenting the potentially endogenous innovation variable RD/TA using the peer average RD/TA. Peer average RD/TA is computed by averaging the RD/TA ratios of all firms within the same industry, country, and year, excluding the focal firm's ith observation. The industry classification is based on the Industry Classification Benchmark Sector Code (ICBSC). Our 2SLS regressions yield Cragg–Donald Wald F-statistics that exceed the critical values suggested by Staiger and Stock (1997) and the rule of thumb threshold of 10, affirming the relevance of our instrument.

[9] Appendix A.6 shows that, overall, our results hold across the decades.

References

Aboody, D., Lev, B., 2000. Information asymmetry, R & D, and insider gains b. J. Financ. 55 (6), 2747–2766.

Alam, A., Uddin, M., Yazdifar, H., Shafique, S., Lartey, T., 2020. R & D investment, firm performance and moderating role of system and safeguard: Evidence from emerging markets. J. Bus. Res. 106, 94–105.

Alshehabi, A., Halabi, H., Afrifa, G., 2023. The effect of time orientation in languages on the recognition of goodwill impairment losses. Int. J. Account..

Bena, J., Li, K., 2014. Corporate innovations and mergers and acquisitions. J. Financ. 69 (5), 1923–1960.

Block, J.H., 2012. R & D investments in family and founder firms: An agency perspective. J. Bus. Ventur. 27 (2), 248–265.

Blundell, R., Griffith, R., Reenen, J.van., 1999. Market share, market value and innovation in a panel of british manufacturing firms. Rev. Econ. Stud. 66 (3), 529–554.

Canace, T.G., Jackson, S.B., Ma, T., Zimbelman, A., 2022. Accounting for R & D: Evidence and implications. Contemp. Account. Res. 39 (3), 2212–2233.

Chan, L.K.C., Lakonishok, J., Sougiannis, T., 2001. The stock market valuation of research and development expenditures. J. Financ. 56 (6), 2431–2456.

Chen, M.K., 2013. The effect of language on economic behavior: Evidence from savings rates, health behaviors, and retirement assets. Am. Econ. Rev. 103 (2), 690–731.

Chen, S., Cronqvist, H., Ni, S., Zhang, F., 2017a. Languages and corporate savings behavior. J. Corp. Financ. 46, 320–341.

Chen, S., Srinidhi, B., Su, L.N., Tong, J.Y., 2017b. The separate and joint effects of the market for corporate control and board effectiveness on R & D valuation. Aust. J. Manag. 43 (2), 203–224.

Chi, J.D., Su, X., Tang, Y., Xu, B., 2020. Is language an economic institution? Evidence from R & D investment. J. Corp. Financ. 62, 101578.

Chu, W.-K., Yang, N.-T., Yang, S.-Y., 2016. Corporate governance' impact on research and development. J. Bus. Res. 69 (6), 2239–2243.

Dahl, Ö., 2008. The grammar of future time reference in European. In: In 6 Tense and Aspect in the Languages of Europe. De Gruyter Mouton, Berlin, Germany, pp. 309–328.

Djankov, S., Glaeser, E., La Porta, R., Lopez-de Silanes, F., Shleifer, A., 2003. The new comparative economics. J. Comp. Econ. 31 (4), 595–619.

Djankov, S., La Porta, R., Lopez-de Silanes, F., Shleifer, A., 2008. The law and economics of self-dealing. J. Financ. Econ. 88 (3), 430–465.

Fasan, M., Gotti, G., Kang, T., Liu, Y., 2016. Language FTR and earnings management: International evidence.

Frederick, S., Loewenstein, G., O'Donoghue, T., 2002. Time Discounting and Time Preference: A Critical Review. J. Econ. Lit. 40 (2), 351–401.

Hall, B., 1993. The stock market's valuation of R & D investment during the 1980's. Am. Econ. Rev. 83 (2), 259–264.

Hall, B.H., 2005. Measuring the returns to R & D: the depreciation problem. Ann. Econ. Stat. 1 (79–80), 341–381.

He, W., Zhang, F., 2022. Languages and dividends. Br. Account. Rev. 54 (6), 101132.

Hechavarrá, D.M., Brieger, S.A., Levasseur, L., Terjesen, S.A., 2023. Cross-cultural implications of linguistic future time reference and institutional uncertainty on social entrepreneurship. Strat. Entrep. J. 17 (1), 61–94.

Hill, C.W.L., Snell, S.A., 1988. External control, corporate strategy, and firm performance in research-intensive industries. Strat. Manag. J. 9 (6), 577–590.

Hofstede, G., 2001. Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations. Vol. 41, SAGE Publications, Inc, London, UK.

Keupp, M.M., Gassmann, O., 2009. Determinants and archetype users of open innovation. R & D Manage. 39 (4), 331–341.

Kim, J., Kim, Y., Zhou, J., 2017. Languages and earnings management. J. Account. Econ. 63 (2), 288–306.

Koh, P.-S., Reeb, D.M., 2015. Missing R & D. J. Account. Econ. 60 (1), 73–94.

Kong, D., Wang, J., Wang, Y., Zhang, J., 2022. Language and innovation. J. Bus. Financ. Account. 49 (1–2), 297–326.

Kunčič, A., 2014. Institutional quality dataset. J. Institutional Econ. 10 (1), 135–161.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., Vishny, R.W., 1997. Legal determinants of external finance. J. Financ. 52 (3), 1131–1150.

Lev, B., 1999. R & D and capital markets. J. Appl. Corp. Financ. 11 (4), 21–35.

Liang, H., Marquis, C., Renneboog, L., Sun, S.L., 2018. Future-time framing: The effect of language on corporate future orientation. Organ. Sci. 29 (6), 1093–1111.

Machokoto, M., Chipeta, C., Ibeji, N., 2021a. The institutional determinants of peer effects on corporate cash holdings. J. Int. Financ. Mark. Institutions Money 73, 101378.

Machokoto, M., Gyimah, D., Ibrahim, B.M., 2022. The evolution of trade credit: new evidence from developed versus developing countries. Rev. Quant. Financ. Account. 59 (3), 857–912.

Machokoto, M., Gyimah, D., Ntim, C.G., 2021b. Do peer firms influence innovation? Br. Account. Rev. 53 (5), 100988.

Machokoto, M., Lemma, T.T., Dsouli, O., Fakoussa, R., Igudia, E., 2023. Coupling men-to-women: Promoting innovation in emerging markets. International. J. Financ. Econ. n/a(n/a).

Na, K., Yan, W., 2022. Languages and corporate tax avoidance. Rev. Account. Stud. 27 (1), 148–184.

Nason, R.S., Patel, P.C., 2016. Is cash king? Market performance and cash during a recession. J. Bus. Res. 69 (10), 4242–4248.

Nishikawa, Y., Joo, M.H., Parhizgari, A.M., 2023. Languages and dividend policy. J. Behav. Financ..

Osei-Tutu, F., Weill, L., 2021. How language shapes bank risk taking. J. Financ. Serv. Res. 59 (1), 47–68.

Parhankangas, A., Renko, M., 2017. Linguistic style and crowdfunding success among social and commercial entrepreneurs. J. Bus. Ventur. 32 (2), 215–236.

Pindado, J., de Queiroz, V., de la Torre, C., 2015. How do country-level governance characteristics impact the relationship between R & D and firm value? R & D Manage. 45 (5), 515–526.

Ritter, A., Wells, P., 2006. Identifiable intangible asset disclosures stock prices and future earnings. Account. Financ. 46 (5), 843–863.

Singhal, N., Kapur, D., 2023. Mind your own business and communicate the same! – signaling content that makes investors interested. J. Entrep. Emerg. Econ. 16 (4), 1023–1042.

Staiger, D., Stock, J.H., 1997. Instrumental variables regression with weak instruments. Econom. 65 (3), 557–586.

Thieroff, R., 2008. On the areal distribution of tense-aspect. In: 6 Tense and Aspect in the Languages of Europe. De Gruyter Mouton, Berlin, Germany, pp. 265–308.

Tong, J.Y., Zhang, F.F., 2014. More evidence that corporate R & D investment (and effective boards) can increase firm value. J. Appl. Corp. Financ. 26 (2), 94–100.