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Financial Development and Language Structures

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Abstract: Using cross country data, we explore the role of linguistic structures for the financial development of countries. Specially, we investigate if future time reference (FTR), the requirement of an obligatory future tense marking in languages, matters for financial development or not. Our results show that countries speaking weak FTR language or a language not needing a dedicated future tense marking have enhanced financial development relative to countries speaking strong FTR language. Discounting the future less or having a connection between the present and the future—characteristics of weak FTR languages—has implications for caring about saving and investment, having efficient property rights, protection of shareholders and cost of acquiring information. Our results are robust to multiple measures of financial development and inclusion of determinants of the same. Finally, results show that weak FTR language speaking countries benefit more when their financial development is low.

Keywords: linguistic structures; future time reference; financial development; discounting future

JEL Classification: O11; Z10; D53

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1. Introduction

The findings related to the role of financial development for economic growth is ambiguous in the literature.[1] While an extensive set of studies have stressed the impact of financial development on economic growth to be positive (Bekaert et al. 2005; Christopoulos and Tsionas 2004; Arestis et al. 2001; Xu 2000; Levine et al. 2000; Levine and Zervos 1998), other studies find financial development's effect on growth to be insignificant (Ho and Saadaoui 2022; Demetriades and Hussein 1996). More recent investigations utilizing time series data exploring the impact of financial development on growth find the effect to be weak or even negative (Cevik and Rahmati 2020; Nwani and Bassey Orie 2016; Adeniyi et al. 2015; Samargandi et al. 2014; Quixina and Almeida 2014). Such findings are of interest, particularly because in the context of other development outcomes, financial development has been shown to be beneficial for poverty alleviation (Rewilak 2017), enhancing the effectiveness for aid-recipient countries (Nkusu and Sayek 2004), promoting foreign direct investment (Desbordes and Wei 2017) and generating comparative advantage for manufacturing economies (Beck 2002).

Given these findings, many studies have explored the determinants of financial development, including institutional determinants (Roe and Siegel 2011; Herger et al. 2008; Beck and Levine 2004; Galindo and Micco 2004; Rajan and Zingales 2003; Johnson et al. 2000), policy determinants (Chinn and Ito 2006; Boyd et al. 2001; Huybens and Smith 1999) and economic development-related determinants (Levine 1997, 2003, 2005; Jaffee and Levonian 2001). We add to this strand of literature by exploring the role of linguistic structures for financial development. Specifically, we explore a specific linguistic trait—future time

reference—and investigate if it explains differences in financial development across countries along with other factors.

In recent years, a number of studies have investigated the effects of linguistic traits on economic outcomes (Chen 2013; Galor et al. 2016; Mavisakalyan et al. 2018). One in particular, future time reference (FTR), is a linguistic trait indicating whether languages require an obligatory future tense marking. Languages such as English and French are *strong* FTR languages, as these languages require a dedicated form when referring to future events. In English, we state *she will go to New York tomorrow*. The same in French is stated as *Elle ira à New York demain*. Words like "will go" and "ira" represent a marked future tense. In contrast, languages such as German and Finnish are *weak* FTR languages, as the same grammatical form can be used for the future and the present. In German, for example, the same sentence can be stated as *Morgen geht sie nach New York.* The word "geht" indicating "goes" can be used for present and future tense.

We hypothesize that financial development is benefitted in countries where agents speak "weak" FTR languages relative to countries speaking "strong" FTR languages. In the context of FTR, the notion of "temporal displacement" (Mavisakalyan et al. 2018) suggests that dedicated used of grammar to indicate future events can make the future very distant for the individual. In the case of these strong FTR languages, the future can potentially appear discontinuous to the present relative to speakers of weak FTR languages.

As emphasized in the literature, the five key functions of the financial system include ex-ante production of information and allocating capital, generating effective corporate governance, mobilization of savings into investment, efficient risk management and minimizing cost in financial transactions (Dutta and Meierrieks 2021; World Bank 2012). We argue that FTR has effects on these outcomes, particularly through the channel of individual differences in future discounting. For example, individuals speaking strong FTR languages may be likely to care less about savings and financial intermediaries under such language structures, are less likely to be bothered less about easing the cost of acquiring capital as that can be put away for the future.[2] Likewise, well-functioning property rights are considered to be an essential part of financial development. The incentive for structuring such operational property rights might be lacking for agents speaking strong FTR languages. Since the future does not seem connected to the present, essential functions of the financial system—allocating resources effectively, protecting investors, sharing of information—can appear less rewarding. Thus, financial development is likely to suffer in countries speaking strong FTR languages. In contrast, agents speaking weak FTR languages are likely to discount the future less, as they cognitively associate the connection between the present and the future relative to strong FTR language speakers, and thus, are incentivized to generate an effective financial system. Under weak FTR language structures, agents are likely to place effort in effectively allocating capital towards saving and investment, create systems that protect investors and shareholders, and work towards minimizing the cost of acquiring information about financial decision making.

Our contribution in this paper is adding to the extensive strand of studies that have looked into the determinants of financial development and highlighting the role of language structures. Our results show that countries speaking weak FTR languages are likely to have between 10 and 25% percentage more financial development (depending on the specific measure of financial development used) relative to countries speaking strong FTR languages. Our results are robust to the inclusion of an array of controls, including political institutions. We check our results to alternate measures of financial development assessing its different characteristics—financial depth, size of the financial system, efficiency and extent of equity market activities.

Section 2 provides a brief background and literature review. Section 3 explains data and the sources. In Section 4, we describe the empirical methodology and benchmark results. Robustness analysis is described in Section 5, and Section 6 concludes.

2. Literature Review

The idea that linguistic traits can influence thought, and thus have effects on human behavior, has long been investigated. Based on the works of de Saussure (1916) and Wittgenstein (1922), the Sapir–Whorf hypothesis (SWH) stresses the idea that language can influence thought. Subsequent lines of research have explored this idea in various context. Though the hypothesis has been supported by many studies, the seminal works of Chomsky (1957) and Pinker (1994) have contested these findings, stressing that languages do not shape human cognition or ways of thinking. In subsequent decades, the Linguistic Relativity Hypothesis (LRH) was developed, which advances the Sapir–Whorf hypothesis by stating that both human cognition and behavior can be shaped by languages. While LRH was regarded as misguided by some linguists and cognitive scientists (Mavisakalyan et al. 2018), a substantial and ever-growing body of literature emerged starting in the 1990s testifying to the validity of the theory (Levinson and Wilkins 2006; Kay and Regier 2006; Boroditsky et al. 2003; Slobin 2003; Levinson 1996).

The idea that there's a direct influence of language on cognition and behavior is at the heart of the Linguistic Relativity Hypothesis (LRH). In a nutshell, the LRH states that the structure of one's language has a systematic influence on cognition and behavior, and as such, different languages represent the world in different ways by emphasizing different aspects of reality. As a result, speakers of a certain language may be more sensitive to various features of the world relative to speakers of another language. For example, studies in psychology like Harner (1981) show that for children speaking English, the use of future tense begins as early as age 3. English is considered to be a strong FTR language or a language requiring a dedicated future marker. Szagun (1978) also investigate differences in FTR for English (strong FTR language) and German (weak FTR language). He found no differences in future verb usage among children but did find such differences being reflected among adults.

As Mavisakalyan and Weber (2018) point out, the studies in economics on the effects of language on social outcomes differ from those studies in linguistics and psychology in a few significant ways. Whereas the former utilize much larger sample sizes and focus on the connection between language and broader economic and social outcomes, those studies in linguistics and psychology tend to use smaller sample sizes and focus on smaller, more specific cognitive effects. While studies like Licht et al. (2007) and Tabellini (2008) have considered linguistic structures as a source of exogenous variation in culture (Mavisakalyan and Weber 2018), more recent studies have considered linguistic traits as proxies for culture (Bhalotra et al. 2015; Santacreu-Vasut et al. 2014). Some studies have focused on investigating the effect of linguistic traits on various outcomes, explaining the association through the channels of both culture and cognition, but without distinguishing well between the two (Hicks et al. 2015; Santacreu-Vasut et al. 2013). Studies like Chen (2013) and Mavisakalyan (2015) claim that linguistic structures affect behavior and, thus, outcomes by directly altering individual's cognition. Studies such as these form the base of the new LRH literature.

As an example of the future marker, we can give the example of English where specific words like "will" or "is going to" has to be used to indicate " it will snow tomorrow". On the other hand, a language like German can imply the same thing by stating *Morgen schneien es* and not using grammar to indicate marked future events. Chen (2013) emphasizes that languages requiring grammar to indicate marked future events or strong future time reference (FTR) languages have speakers that are less future-oriented behavior which, in turn, lead inefficient outcomes.[3] As examples of inefficient outcomes, Chen finds that individuals speaking strong FTR languages save less, have less wealth after retirement, smoke more, tend to be obese and engage in unsafe sex.[4]

Galor et al. (2016) mention that speakers of languages that do not have marked grammar use indicating future tense are likely to have long-term orientation. Long term orientation or the lack of it affects individual's discounting of future. A reduction in an agent's discount rates can be because of long term orientation. Speakers of strong

FTR languages are likely to discount much more relative to speakers of weak FTR languages (Mavisakalyan et al. 2018). As such, FTR is relevant to the long tradition of studies on the human tendency to discount future costs and rewards (Frederick et al. 2002; Kirby and Herrnstein 1995; Solnick et al. 1980; Ramsey 1928).[5]

3. Data

3.1. The Sample

Our sample consists of an unbalanced panel of 100 developed and developing countries over the period 2001 to 2018. The panel is unbalanced because our variables of interest are not available for each country for every year. Overall, we have 844 observations for 100 countries, or approximately 8.44 observations for each country. We compile our data from the World Bank's Global Financial Development Database (GFDD) and World Development Indicators (WDI), as well as from Chen (2013). Below we describe our variables of interest in detail.

3.2. The Main Variables

As our benchmark measure of financial development, we consider the most used measure in the literature—private credit to GDP (Ibrahim and Alagidede 2017a; Jauch and Watzka 2015; Adeniyi et al. 2015; Nikoloski 2012; Clarke et al. 2006; Levine 2005). Specifically, this variable is defined as "domestic private credit to the real sector by deposit money banks" as a percentage of GDP (World Bank 2012). Private credit does not include credits issued to governments and public enterprises, nor does it include credits issued by central banks. This variable is a common measure of financial dept, which captures the financial sector relative to the economy, and has been documented in the literature as having a strong association with long-term economic growth (Beck et al. 2009). A measure of efficient credit allocation, private credit to GDP, signals the credit worthiness of private institutions, as well as accessibility of the credit market to private individuals (Jauch and Watzka 2015). The mean of the variable for our sample is about 73.5 percent with the range of the variable being from 6 percent to about 300 percent,[6] and the median of the variable is about 65%. For example, countries like Nigeria, Algeria, Pakistan, Mexico, Argentina and Ghana all have less than 22.5% private credit, which is the 10th percentile value of our sample.

The other alternate measure we considered is *private money by deposit money bank and other financial institutions and other financial institutions to GDP*. This is a standard alternate indicator of financial depth that has been used in the finance and growth literature (Beck et al. 2000, 2009). The mean for the variable for our sample is 81.34%, and the median of the variable is about 71%. We consider additional financial development measures as part of robustness analysis, which we discuss in subsequent sections.

3.3. Independent Variable

Based on Chen (2013), we classify languages that need a dedicated future marking (such as English and French) as a strong FTR language. On the other hand, languages like German and Finnish that do not require dedicated grammar use to mark future events are categorized as weak FTR languages.[7] We construct a dummy, taking the value of 1 for weak FTR languages and 0 for strong FTR languages. We chose this as our independent variable because, as Chen (2013) indicates, agents' intertemporal preferences and decision making are represented via strong and weak FTR languages. Likewise, Mavisakalyan et al. (2018) argue that future tense (for strong FTR languages) can be used to indicate cultural factors, and that usage of such can effect speakers' cognition and behavior (or both).

For our sample of countries, 28.2 percent of observations are assigned a dummy of 1 (indicating weak FTR languages), while the remaining 71.8 are assigned 0 (representing strong FTR languages). Our sample has sufficient regional and continental variation. For example, a number of European countries including Denmark, Belgium, Estonia, Germany, Finland, Iceland and Luxembourg have weak FTR languages. Yet, other European countries

like France, Czech Republic, Latvia, Greece, Italy, Lithuania, Poland and United Kingdom have strong FTR languages.

Following Chen (2013) and Mavisakalyan et al. (2018), the language considered for each country is the major spoken language. Chen (2013) mentions that, for the majority of countries in our sample, there is no intra-country variation in terms of FTR strength. This implies that, in most countries, either one language dominates or a common FTR structure is shared among the languages for multi-lingual countries. As an example of the latter, Chen points to the example of Canada. While the country has significant English and French speaking populations, both are strong FTR languages. Likewise, Mavisakalyan et al. (2018) mentions that since available information on multi-lingual countries is not easily available, checking results with an alternate measure—share of total population speaking a strong FTR language—reduces the sample. As part of robustness analysis, we consider this measure and check our results.

3.4. Controls

We follow the literature in our choice of benchmark controls, which consist of GDP per capita growth, urban population as a percentage of total population, labor force participation rates, trade openness and polity as a measure of political institutions. Studies like Huang and Temple (2005) and Svaleryd and Vlachos (2002), for instance, show that trade openness is a significant determinant of financial development. Based on both demand and supply side arguments, studies like Jung (1986), Goldsmith (1969), Gurley and Shaw (1967) and Patrick (1966) have stressed a causal relationship from economic growth to financial development. For this reason, we include GDP per capita growth as a measure of economic development within our benchmark controls. As a further measure of economic development (based on the demand side argument), we control for urban population as a percentage of total population. Lastly, since multiple studies have shown that democratic institutions are an important determinant for financial development, we consider the Polity 2 variable, which runs from −10 to +10 with higher values implying more democratic institutions (Begović et al. 2017; Bhattacharyya 2013; Yang 2011; Huang 2010; Clague et al. 1996).

4. Empirical Methodology and Benchmark Results

4.1. Empirical Specification and Methodology

Based on our hypothesis, we test the following regression specification:

$$\mathrm{FD}_{it} = \beta_0 + \beta_1 FTR_i + controls + \varnothing_t + \epsilon_{it}$$

FD_{it} represents the specific financial development measure considered for country i in time t. Our main independent variable of interest is FTR, which represents the future time reference dummy. We remind our readers that FTR dummy takes 1 for weak FTR countries, and 0 for strong FTR countries. According to our hypothesis, we expect β_1 to be positive and significant. This would imply that financial development is higher in weak FTR countries (i.e., those with languages that do not require a dedicated form when referring to future events) relative to strong FTR countries. β_1 being negative and significant would mean the opposite.

Our benchmark measure of financial development is private credit to the real sector by deposit money banks as a percentage of GDP. As an alternate benchmark measure of financial development, we consider private credit to the real sector by deposit money banks and other financial institutions as a percentage of GDP. Our robustness analysis considers alternate measures of financial development.

Since linguistic features and financial development are likely the product of deeper, unobserved factors, we follow the literature in constructing our battery of controls, including observables that can help explain differences in financial development across countries. These, in turn, are unlikely to make the effect of FTR on financial development exogenous and uncorrelated with the error term. Controlling for observables that can help explain

differences in financial development across countries is the first step to mitigate bias arising out of omitted variable bias.[8] As explained, our benchmark controls are GDP per capita growth, urban population as a percentage of total population, labor force participation rates, trade openness and polity as a measure of political institutions. These variables have been shown to matter for financial development. In the robustness section, we discuss further controlling for additional variables as well as mitigating the effect of unobserved heterogeneity with respect to the effects of FTR on financial development.

Our benchmark analysis consists of ordinary least squares (OLS) regressions. $\varnothing_t$, our time fixed effects, help us take into account time shocks. For example, global shocks, like the 2009 recession, that likely impact financial development should be captured in time fixed effects. In addition to our OLS specifications, we consider quantile regressions to make sure our results are not driven by the presence of outliers. We talk about endogeneity and how our findings should be interpreted in subsequent sections.

4.2. Benchmark Results

In Table 1, we present our first set of benchmark results with OLS regressions. The dependent variable considered is private credit to GDP. In column (1), we run a bivariate regression without any controls to assess the variation in financial development that is attributed to weak and strong FTR languages. Based on column (1), we find that, relative to strong FTR countries, weak FTR countries have 41 percent more private credit (as a percentage of GDP). Providing an example, this suggests that when compared against strong FTR countries (such as India), weak FTR countries (such as Indonesia) should have much more private credit. However, the coefficient of the FTR dummy in column (1) is capturing effects of other variables that also affect financial development. We add controls in subsequent columns. In column (2), we add labor force participation rate, and in column (3), we control for urban population as a percentage of total population. In column (4), GDP per capita growth is included, and in column (5), we control for trade as a percentage of GDP. Finally in column (6), we add the polity score, which is a measure of how relatively democratic a nation is in terms of its governance.

Table 1. Private Credit and FTR. OLS regressions with time fixed effects: The dependent variable is private credit by deposit money banks as a percentage of GDP. FTR is future time reference dummy with 1 indicating weak FTR countries and strong FTR countries. The controls for labor force participation rate (LFPR), urban population as a percentage of total population, GDP per capita growth, trade as percentage of GDP and polity. Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$.

	(1)	(2)	(3)	(4)	(5)	(6)
Weak FTR	41.22 ***	33.35 ***	29.12 ***	29.45 ***	24.51 ***	23.25 ***
	(3.355)	(3.306)	(3.484)	(3.491)	(3.597)	(3.620)
LFPR	—	0.827 ***	0.778 ***	0.785 ***	0.911 ***	0.801 ***
		(0.131)	(0.127)	(0.126)	(0.129)	(0.122)
Urban Population	—	—	0.402 ***	0.329 ***	0.299 ***	0.232 ***
			(0.087)	(0.092)	(0.088)	(0.087)
GDP per cap. growth	—	—	—	−1.520 ***	−1.812 ***	−1.890 ***
				(0.508)	(0.521)	(0.515)
Trade	—	—	—	—	0.165 ***	0.146 ***
					(0.024)	(0.025)
Polity	—	—	—	—	—	0.307
						(0.298)
Constant	60.40 ***	19.64 **	−6.692	−0.061	−13.49	−3.707
	(7.559)	(9.414)	(10.91)	(11.23)	(11.33)	(11.19)

Table 1. *Cont.*

	(1)	(2)	(3)	(4)	(5)	(6)
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	778	778	778	777	769	748
R-squared	0.192	0.241	0.261	0.270	0.304	0.262

Once we include all of the aforementioned controls, the effect of FTR on private credit drops to 23 percentage points. This implies that weak FTR countries have 23 percentage points more private credit than strong FTR countries. Our controls are predominantly significant and are of expected sign and significance.[9]

To account for potential outliers driving our results, we replicate the specifications from Table 1 in Table 2 by using quantile regressions. The results are very similar. The magnitude of FTR dummy is marginally higher compared to Table 1.

Table 2. Private Credit and FTR. Quantile regressions with time fixed effects: The dependent variable is private credit by deposit money banks as a percentage of GDP. FTR is future time reference dummy with 1 indicating weak FTR countries and strong FTR countries. The controls for labor force participation rate (LFPR), urban population as a percentage of total population, GDP per capita growth, trade as percentage of GDP and polity. Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$.

	(1)	(2)	(3)	(4)	(5)	(6)
Weak FTR	46.60 ***	38.34 ***	34.06 ***	33.66 ***	27.87 ***	26.28 ***
	(3.228)	(4.089)	(4.230)	(4.237)	(4.238)	(4.044)
LFPR	—	0.552 ***	0.389 ***	0.364 **	0.353 **	0.378 ***
		(0.146)	(0.146)	(0.147)	(0.145)	(0.140)
Urban Population	—	—	0.465 ***	0.446 ***	0.432 ***	0.424 ***
			(0.109)	(0.113)	(0.109)	(0.109)
GDP per cap. growth	—	—	—	−0.465	−1.129 **	−1.394 **
				(0.590)	(0.570)	(0.547)
Trade	—	—	—	—	0.164 ***	0.139 ***
					(0.032)	(0.033)
Polity	—	—	—	—	—	0.182
						(0.354)
Constant	60.12 ***	36.99 ***	14.70	16.85	5.088	5.892
	(8.152)	(12.10)	(14.01)	(14.25)	(14.10)	(13.81)
Observations	778	778	778	777	769	748

For example, in column (1), when we do not include any control variables, the magnitude of difference between weak FTR and strong FTR countries in terms of private credit is 46 percentage points. Once we control for all the variables, it drops to 26 percentage points. The sign and significance of the control variables remain similar to our previous table.

In Table 3, we consider an alternate measure of financial development—private credit to the real sector by deposit money banks and other financial institutions as a percentage of GDP. As mentioned earlier, this is a broader measure of financial depth. We consider both OLS and quantile regressions including all controls. Column (1) in Table 3 presents OLS regression, while column (2) presents quantile regressions. Here, we find that the impact of the FTR dummy for the OLS regression is stronger than in the case of quantile regression.

While weak FTR countries have 21 percentage points more private credit (including financial institutions) relative to strong FTR countries in the case of OLS regression, the effect drops to 15 percentage points in the case of quantile regression. Labor force participation rate (LFPR) and urban population are positive and significant in both regressions, while GDP per capita growth is negative and significant in both cases. Trade is not significant in Table 3 specifications.

Table 3. Private Credit (including Financial Institutions) and FTR. OLS and Quantile regressions with time fixed effects: The dependent variable is private credit by deposit money banks and other financial institutions as a percentage of GDP. FTR is future time reference dummy with 1 indicating weak FTR countries and strong FTR countries. The controls for labor force participation rate (LFPR), urban population as a percentage of total population, GDP per capita growth, trade as percentage of GDP and polity. Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)
	OLS	**Quantile**
Weak FTR	21.76 ***	15.36 ***
	(4.326)	(5.561)
LFPR	0.869 ***	0.571 ***
	(0.135)	(0.193)
Urban Population	0.411 ***	0.614 ***
	(0.100)	(0.150)
GDP per cap. growth	−1.962 ***	−1.667 **
	(0.562)	(0.752)
Trade	0.043	0.049
	(0.028)	(0.046)
Polity	0.606 *	0.733
	(0.326)	(0.486)
Constant	−5.785	−10.72
	(13.33)	(19.00)
Observations	748	748
R-squared	0.224	NA

5. Robustness Analysis

For our robustness analysis, we conduct an array of tests to make sure our results are not sensitive additional controls, alternate fixed effects, or other measures of our linguistic variable (FTR). We start our robustness analysis by controlling for continent fixed effects within our benchmark specifications, the importance of which is emphasized by Ang (2019). Additionally, we consider regional dummies based on the country income classification by the World Bank, as is commonly used in the literature. As Mavisakalyan et al. (2018) point out, because linguistic features can be spatially correlated, this implies that linguistic features can be concentrated in certain areas. Thus, the effect of FTR can be biased due to geographic and climatic factors that are correlated. We present the results in Table 4 with both measures of financial development considered in our benchmark analysis.

Our main conclusions remain unchanged. The impact for private credit as evident from specification (1) is around 12 percentage points, which again implies that weak FTR countries have more private credit compared to strong FTR countries. As anticipated, controlling for continent fixed effects does reduce the magnitude of FTR dummy relative to previous specifications.

We continue our robustness analysis by controlling for additional variables to further mitigate omitted variable bias. Following the extensive literature on the determinants of financial development, we include different measures of human capital in Table 4 to bolster our benchmark set of controls. As Ibrahim and Sare (2018) found, human capital has a robust influence on financial development, thus creating greater demand for financial intermediation and services that constitute the process of financial development.[10] In Table 4 column (1), we consider a measure of human capital—net primary enrollment. As an alternate measure of human capital, secondary (net) enrollment in considered in column (2).

Table 4. Private Credit and FTR—Including additional controls. OLS regressions with time fixed effects: The dependent variable is private credit by deposit money banks as a percentage of GDP. FTR is future time reference dummy with 1 indicating weak FTR countries and strong FTR countries. The benchmark controls for labor force participation rate (LFPR), urban population as a percentage of total population, GDP per capita growth, trade as percentage of GDP and polity. The additional controls are school enrollment (primary), school enrollment (secondary), foreign direct investment inflows, constraints on the chief executive, durability (democracy) and inflation. Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$.

	(1)	(2)	(3)	(4)	(5)
Weak FTR	12.46 ***	11.79 ***	12.94 ***	15.14 ***	13.17 ***
	(3.719)	(3.892)	(3.703)	(3.283)	(3.492)
LFPR	0.905 ***	1.361 ***	0.898 ***	0.514 ***	0.698 ***
	(0.126)	(0.139)	(0.127)	(0.122)	(0.119)
Urban Population	−0.095	−0.325 ***	−0.118	−0.238 **	−0.050
	(0.112)	(0.099)	(0.111)	(0.105)	(0.107)
GDP per cap. growth	−4.297 ***	−3.438 ***	−4.270 ***	−3.580 ***	−4.153 ***
	(0.642)	(0.598)	(0.635)	(0.567)	(0.517)
Trade	0.188 ***	0.123 ***	0.179 ***	0.163 ***	—
	(0.027)	(0.022)	(0.026)	(0.027)	
Polity	1.554 ***	−0.347	—	—	—
	(0.327)	(0.376)			
School enrollment (primary)	2.186 ***	—	2.185 ***	1.946 ***	2.094 ***
	(0.280)		(0.282)	(0.285)	(0.264)
School enrollment (secondary)	—	1.515 ***	—	—	—
		(0.111)			
Constraints (chief exec)	—	—	5.424 ***	—	3.029 ***
			(1.023)		(0.994)
Durable (dem)	—	—	—	0.369 ***	—
				(0.054)	
FDI	—	—	—	—	0.142
					(0.141)
Inflation	—	—	—	—	15.34 ***
					(1.354)
Constant	−212.6 ***	−110.5 ***	−232.5 ***	−161.1 ***	−332.4 ***
	(26.53)	(15.54)	(27.76)	(25.72)	(27.49)
Observations	587	524	585	587	587
R-squared	0.392	0.476	0.397	0.462	0.468

Likewise, political institutions have been shown to be an important determinant of financial development in the literature. As Pagano and Volpin (2001) point out, self-interested policy makers can intervene in financial markets for promotion of group interests. Rajan and Zingales (2003) also emphasize the role that interest groups can play in financial development. As Huang (2010) argues, the presence of a stronger elite group favors the interests of elites and restricts democratic participation. Greater shift of power towards elite groups potentially makes the system more autocratic and results in greater obstacles for financial development. In this context, Girma and Shortland (2008) have shown that both democracy and regime change matters for financial development.

With these in mind, we check the sensitivity of our findings with alternate measures of political institutions (other than polity, which we used in our benchmark regressions). The first variable we use is constraints on the chief executive. Based on the data and definition provided by Marshall et al. (2019), the variable, "refers to the extent of institutionalized constraints on the decision-making powers of chief executives, whether individuals or collectivities". It ranges from 1 to 7, with higher numbers denoting greater constraints as measured by the ability in which "accountability groups" may impose limitations. For example, in Western democracies, these typically take the form of legislatures. Column (3) of Table 4 considers the constraint measure instead of polity.

As an alternate measure, we consider the durability of the political system. Based on the definition set forth by Marshall et al. (2019), it is measured as the number of years "since the last substantive change in authority characteristics (defined as a 3-point change in the POLITY score)". We consider this measure in column (4). Finally, in column (5) of the table, we consider inflation as an additional control variable.

For all the specifications in Table 4, we consider private credit by deposit money banks (excluding other financial institutions) as the dependent variable. As we can see from the table, the coefficient of FTR is positive and significant for all specifications. In terms of magnitude, for weak FTR countries, weak FTR countries have between 11 and 15 percentage points more private credit. These findings, given our additional controls, suggest that greater constraints and a more durable political system enhance financial development. Likewise, the effects of both education measures are positive and significant as well.

Next, we next consider alternate measures of financial development as dependent variables. We present these results in Table 5. The first alternate measure we consider is liquid liabilities as a percentage of GDP. The measure, used by King and Levine (1993), is the broadest indicator of financial intermediation as it encompasses currency as well as interest bearing liabilities of banks and other financial intermediaries. One other alternate measure considered is bank credit as a percentage of bank deposits. As Beck et al. (2009) state, this measure indicates the ratio of claims on the private sector to deposits in money banks. It is a measure of the efficiency of the financial system as it assesses the extent to which "banks intermediate society's savings into private sector credits". The other two measures considered are equity market indicators, including stock market capitalization and stock market total value, both as a percentage of GDP. The size of the equity markets relative to the size of the economy are captured by these two indicators. The first measure, stock market capitalization to GDP, assessing activity of the stock market equals total shares traded on the stock market as a percentage of GDP. The second measure, stock market total value to GDP, also measures activity of the stock market but in terms of trading volume as a share of national output.

In Table 5, we find that the FTR dummy is positive and significant across all measures. The effect of the FTR dummy is the strongest in the case of the liquid liabilities measure, while the magnitude is the least in the case of stock market capitalization measure. In the case of liquid liabilities, weak FTR countries have 34 percentage points more liquid liabilities relative to strong FTR countries. In the case of bank deposits, the magnitude is about 23 percentage points.

Table 5. Alternate Measures of Financial Development and FTR. OLS regressions with time fixed effects: The dependent variables are liquid liabilities (% of GDP), stock market capitalization (% of GDP), stock market total value traded (% of GDP) and bank deposits as percentage of bank credits in columns (1), (2), (3) and (4), respectively. FTR is future time reference dummy with 1 indicating weak FTR countries and strong FTR countries. The benchmark controls for labor force participation rate (LFPR), urban population as a percentage of total population, GDP per capita growth, trade as percentage of GDP and polity. Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)
	Liquid Liabilities	**Stock Market Cap.**	**Stock Market Total Val.**	**Bank Deposits**
Weak FTR	35.84 ***	9.224 **	18.77 ***	23.44 ***
	(5.558)	(3.896)	(5.146)	(6.098)
LFPR	−0.307 *	1.179 ***	0.980 ***	1.237 ***
	(0.168)	(0.134)	(0.141)	(0.302)
Urban Population	0.581 ***	0.450 ***	0.137	−0.273
	(0.126)	(0.113)	(0.105)	(0.176)
GDP per cap. growth	−0.470	0.282	−0.185	0.268
	(0.659)	(0.482)	(0.552)	(0.660)
Trade	0.601 ***	0.053 **	−0.207 ***	0.092
	(0.133)	(0.025)	(0.032)	(0.080)
Polity	−1.223 ***	0.355	0.130	−1.913 **
	(0.414)	(0.270)	(0.398)	(0.882)
Constant	1.542	−42.24 ***	5.338	70.73 ***
	(18.04)	(11.62)	(16.61)	(16.98)
Observations	744	601	600	729
R-squared	0.362	0.280	0.210	0.127

For the final part of our robustness analysis, we investigate if strong or weak FTR matters differently for high or low levels of financial development. In other words, do countries speaking weak FTR languages benefit more if they have *lower* levels of financial development relative to countries speaking weak FTR countries but have *higher* levels of financial development? We run quantile regressions for the 25th, 50th and 75th percentiles of financial development based on our sample. In Table 6, we consider our benchmark measure of financial development—private credit. We also consider the other broader measure of private credit—private credit to the real sector by deposit money banks and other financial institutions as a percentage of GDP. In column (1), we consider the private credit measure, and in column (2), we consider the private credit (plus financial institutions) measure. We report the results for our main variable of interest, FTR dummy, for the 25th, 50th and 75th percentiles of financial development.[11]

We find that the FTR dummy has the strongest effect for both measures of financial development for the 25th percentile. For both measures, weak FTR language speaking countries with financial development in the 25th percentile have about 26–27% more private credit or private credit (plus financial institutions) relative to strong FTR language countries in the same financial development percentile. For countries in the highest percentile (75th percentile) of financial development, weak FTR language speaking countries also benefit more than strong FTR language speaking countries but by a lesser magnitude. Thus, across all specifications, we observe that weak FTR languages are associated with enhanced financial development relative to strong FTR countries.

Table 6. Financial Development Percentiles and Private Credit. OLS Regressions with time fixed effects: The dependent variables are liquid liabilities (% of GDP), stock market capitalization (% of GDP), stock market total value traded (% of GDP) and bank deposits as percentage of bank credits in columns (1), (2), (3) and (4), respectively. FTR is future time reference dummy with 1 indicating weak FTR countries and strong FTR countries. The benchmark controls for labor force participation rate (LFPR), urban population as a percentage of total population, GDP per capita growth, trade as percentage of GDP and polity. Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$.

	(1)	(2)
	Private Credit	**Private Credit (including fin. Inst.)**
25th Percentile		
Weak FTR	26.391 ***	27.667 ***
	(6.562)	(6.084)
O.25 Pseudo R	0.155	0.134
50th Percentile		
Weak FTR	26.277 ***	15.355 **
	(6.040)	(7.199)
O.50 Pseudo R	0.171	0.154
75th Percentile		
Weak FTR	16.236 ***	17.922 **
	(4.301)	(7.203)
O.75 Pseudo R	0.179	0.186
Observations	748	748

6. Conclusions

Given the implications of financial development for economic growth and varied development outcomes (Ibrahim and Alagidede 2017b; Mishra and Narayan 2015; Masten et al. 2008; Rioja and Valev 2004; Calderon and Liu 2003), the factors that shape a country's economic development remains an important research question to consider. Our results add to the literature on the determinants of financial development by finding that linguistic structures of countries play an important role in affecting financial development. Specifically, our results show that countries speaking weak future time reference (FTR) language experience enhanced financial development relative to countries speaking strong future time reference (FTR) languages. In light of this, weak FTR languages discount the future relatively less and maintain the connection between present and the future. Due to this, individual speakers of these languages are more likely to work towards creating and bettering property rights institutions, investor protection, efficient corporate governance and information symmetry for all participants in financial markets. In terms of policy implications, it does not seem reasonable to build policies to change language structures. Linguistic structures are exogenous factors and prevalent in countries over the very long term. Yet, being aware of how such language structures can affect financial development can help policy makers to create an environment that can mitigate the adverse effect of strong FTR languages.

We want to point out that this is a preliminary analysis exploring the relationship between linguistic traits and financial development. We want to remind our readers again that our results and economic interpretations should be read as significant correlation between the variables and not as causation. Future studies can establish identification considering external instruments or matching techniques. We have stuck to the benchmark measure of FTR used in the literature, which is the dummy indicating strong or weak FTR countries based on major spoken language. Additional nuanced measures considering language family or verb ration is beyond the scope of our analysis. We hope this study leads to further research on the important topic of language structures and financial markets and institutions.

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Notes

1 "Financial development" generally refers to a financial system's ability to engage in information and capital allocation, effective corporate governance, the mobilization of savings into investment, efficient risk management, and minimizing the costs of financial transactions (Dutta and Meierrieks 2021; World Bank 2012).

2 For instance, see Dar and Sahu (2022), who highlight three possible channels through which the effects of FTR are mediated upon financial inclusion, including patience, educational attainment, and tax morale.

3 Importantly, Chen (2013) points out that differences between weak and strong FTR language speakers, "… do not reflect innate cognitive nor early cultural differences between speakers of different languages …".

4 In response to questions regarding spurious correlations in Chen (2013), a study by Roberts et al. (2015) introduced additional controls and robustness analyses to further account for the idea that cultures and languages co-evolve, as opposed languages being strictly exogenous. Controlling for the geographic and historical interrelatedness of languages. Their results yield weaker results than Chen (2013), but continued to find a considerably robust correlation between linguistic features and future-oriented decision making.

5 While a number of studies make the connection between FTR and future decision-making, several recent studies provide contrary evidence. See for instance Chen et al. (2019), Angerer et al. (2021), and Jäggi et al. (2022), who examined the linguistic-savings hypothesis and did not find evidence in support of the hypothesis.

6 Similar to variables like Foreign Direct Investment as a percentage of GDP or Trade as a percentage of GDP, for small countries with small GDP, the private credit share can be much larger.

7 Chen's classification of languages that need an obligatory future time reference is adopted from the European Science Foundation's Typology of Languages in Europe (EUROTYP) project (Dahl 2000). In the case of non-European languages, Chen uses established cross-linguistic analyses. Of the latter, see Cyffer et al. (2009); Nurse (2008); Bybee et al. (1994); Dahl (1985); Dahl and Dienes (1984).

8 That is, while our results are not causal in nature, they are strongly correlative across numerous specifications.

9 For example, the positive and significant association between trade openness and financial development has been document by several studies (Baltagi et al. 2009; Huang and Temple 2005).

10 These findings have been supported with country specific data. For Turkey, for example, see Eryiğit et al. (2015); for India, see Arora and Ratnasiri (2011).

11 Keeping space constraint in mind, additional results are available on request.

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