# How Language Shapes Bank Risk Taking

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## Abstract

We analyze the impact of language on risk-taking behavior of banks. Our hypothesis is that strong future time reference (FTR) languages, i.e., languages that grammatically distinguish between present and future events, lead banks to take more risk. We analyze the relationship between future tense form of the language and bank risk using a sample of 1,402 from 82 countries over the 2010-2017 period. We find that strong FTR banks take more risk in accordance with our prediction. This finding is robust to the inclusion of alternative culture indicators, to alternative definitions of bank risk and of future time reference.

**JEL Codes**: G21, Z13
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# 1. Introduction

Languages differ, not only in how they employ sounds, but how they affect speakers' behavior and view of reality (Gumperz and Levinson, 1991; Boroditsky, 2001). Therefore, linguistic features can influence economic behavior of individuals (Mavisakalyan and Weber, 2018).

The influence of future tense has received particular attention in the recent years. A critical difference across languages is whether or not they grammatically separate present and future events. Some languages like English, referred as strong future time reference (FTR) languages, force speakers to grammatically make a distinction between future and present events. Other languages like Chinese, referred as weak FTR languages, allow speakers to naturally use the present tense to talk about future events as if these events were happening now. Research in linguistics has shown that the use of a strong FTR language diminishes the psychological importance of the future by conceptually separating the present and the future. Chen (2013) has found support for this hypothesis by showing that speakers of strong FTR languages have a less-future oriented behavior: they save less, invest less in their health, and retire with less wealth than speakers of weak FTR languages.

Two recent works at the corporate level have corroborated this hypothesis. Liang et al. (2014) show that firms with strong FTR languages perform worse in corporate social responsibility, a future-oriented activity, than those with weak FTR languages. Chen et al. (2017) find that strong FTR language firms have lower precautionary cash holdings than weak FTR language firms.

Thus a bunch of studies show that the dissociation between the present and the future in the language influences the behavior of economic agents through individual and corporate decisions. As a consequence, a natural research question is whether this linguistic distinction could influence the risk-taking behavior of banks. Namely the risk-taking behavior of banks is influenced by how bank managers consider the future. Higher risk-taking behavior is associated with higher potential losses in the future. Thus, to view the future as more distant should contribute to enhance the risk-taking behavior of banks by reducing the perception of potential losses.

We investigate this hypothesis in this paper. We examine the future tense marking of languages, and assess whether different ways of speaking about the future lead banks to take risk differently. To do so, we analyze the relationship between future tense form of the

language and bank risk using a sample of 1,402 banks based in 82 countries over the 2010-2017 period.

Our results provide evidence for the influence of future tense on bank risk. We find that strong FTR languages enhance bank risk. This finding is observed when we control for different culture indicators and when we test alternative measures of bank risk and of future tense reference. This evidence is consistent with the hypothesis that strong FTR languages influence banks to take higher risk.

Our paper therefore contributes to two strands of literature. First, we augment the vast literature on the determinants of bank risk-taking. This strand of literature has identified a large set of factors like governance (Pathan, 2009), bank competition (Berger, Klapper and Turk-Ariss, 2009), but also political institutions (Ashraf, 2017) and religiosity (Adhikari and Agrawal, 2016). We extend this strand of research in the direction of the language with the first study examining how language can shape the risk-taking behavior of banks. Second, we contribute to the literature on the impact of language on economic behavior. We complement Chen (2013)'s work on individual behavior by investigating bank behavior.

This work has important implications. From a positive perspective, the finding that strong-FTR language increases bank risk provides support to the view that language would explain cross-country differences in bank risk and in the frequency of banking crises. From a normative perspective, it suggests that bank CEOs with a weak-FTR language should be favored to reduce risk-taking behavior of banks.

The rest of the paper is organized as follows. In Section 2, we discuss the background of our research question. Section 3 describes the data and the empirical method. Section 4 provides estimation results, and section 5 shows the robustness checks. Section 6 concludes the paper.

## 2. Background

The *Linguistic Relativity Hypothesis*, also known as the Whorf-Sapir hypothesis, holds that the structure of a language has an influence on its speakers' behavior and how they conceptualize the world (Whorf, 1956). The strong version of this hypothesis states that language determines thought and controls the cognitive processes, while the weak version assumes that language exerts some constraints on cognition. While the strong version has

been viewed as misguided, several studies support the weak version (e.g., Kay and Kempton, 1984; Slobin, 2003; Regier and Kay, 2009).

In line with the weak version, language would shape behavior without controlling the whole cognitive process. For example, Boroditsky (2001) uses an experimental approach to document that language is a powerful tool in shaping habitual thought, and thought about abstract domains like time. Winawer et al. (2007) have shown that for languages which have specific names for different shades of colors, speakers of such languages tend to recognize different color codes more easily. For example, Russian has specific names for different shades of blue, and as such, Russian speakers find it easier to remember and recognize different shades of blue than English speakers. In documenting the importance of language on influencing thoughts, Edward Sapir, writes:

> *"Human beings...are very much at the mercy of the particular language which has become the medium of expression for their society.... The fact of the matter is that the "real world" is to a large extent unconsciously built up on the language habits of the group"* (Sapir, 1929, p. 209)

Regarding time, languages have different ways of grammatically making reference to future events. Some languages like German or Chinese use the present sense to talk about future events. However other languages like French or English force their speakers to change the structure of the tense when referring to events in the future, either through the use of an auxiliary verb (like in English[1]) or of a dedicated future tense form (like in French).

We can illustrate these differences across languages with an example. French and English speakers are required to switch from the present tense to the future tense when talking about expectations of the weather tomorrow:

1) English a. It is cold today (PRESENT)
   b. It will/is going to be cold tomorrow (FUTURE)

2) French: a. Il fait soleil aujourd'hui.(PRESENT)
   "*It is sunny today"*
   b. Il fera soleil demain (FUTURE)
   "*It will be sunny tomorrow*"

[1] English speakers can sometimes speak about future events with a non-future tense verb (for e.g. "the teacher arrives tomorrow"). However, as documented by Copley (2009), this way of speaking is only used when speakers want to talk about planned/scheduled/habitual events, or events arising from law-like properties of the world.

On the other hand, when German and Chinese speakers expect the weather to be cloudy tomorrow, they would normally talk about it using the present tense:

3) German: a. Heute ist es bewölk (PRESENT)
*"Today it is cloudy"*

b. Morgen ist es bewölk (FUTURE)
"*Tomorrow it is cloudy"*

4) Chinese: a. Jintian shi duoyun (PRESENT)
*"Today is cloudy"*

b. Mingtian shi duoyun (FUTURE)
"*Tomorrow is cloudy"*

It is worth noting that it is possible for Germans to make reference to the future with the future tense marker "*werden"*. However, in German, like other weak-FTR languages, speakers are not required to use this future tense marker every time they talk.

Chen (2013) refers to languages with no separation between the present and the future as weak-FTR languages, whereas languages with a clear separation are strong-FTR languages. He therefore develops a classification of languages into both categories.

This linguistic distinction can then influence speaker's behavior and cognition by exerting an impact about the timing of future events. In strong-FTR languages, speakers can perceive the future to be more distant when talking about future events. Symmetrically, speakers of weak-FTR languages can perceive the future as more immediate and certain to manifest since they are able to talk about future events in the present tense, i.e. as if the events were happening now.

Thus, since a strong-FTR language makes the future feel more distant from the present, it can alter the importance of the risks associated with loans. A lending decision today is associated with potential loan losses tomorrow. As a consequence, a future perceived as more distant should contribute to reduce the reluctance of banks to grant loans since it diminishes the perception of potential loan losses. A strong-FTR language should then be associated with higher risk-taking behavior of banks. Our hypothesis is thus that banks with strong-FTR languages have higher risk than banks with weak-FTR languages.

This hypothesis accords with the role of future time reference in shaping intertemporal preferences for individual behavior (e.g. Chen, 2013; Sutter et al., 2015) and corporate

behavior (e.g. Chen et al., 2017). We therefore extend these former findings through an analysis of how language can shape intertemporal preferences for bank behavior.

## 3. Data and methodology

### 3.1 Data

We extract data from Orbis Bank for all variables related to bank characteristics. We consider the period 2010-2017. We keep only commercial banks to have a homogenous sample in terms of activities and use only consolidated statements for each bank. Data on language FTR is compiled from Chen (2013)'s classification of languages. Data on macroeconomic variables are collected from World Development Indicators and governance variables come from World Governance Indicators database.

We restrict the sample to countries for which Chen (2013) classifies their official language into the strong FTR and weak FTR categories. We drop all observations with missing necessary accounting information and we eliminate countries with only one bank. Since our main measure of bank risk requires three years of consecutive years of information, we only keep banks in line with this criterion. We winsorize all bank-level variables at 1% (lowest and highest values) to eliminate the effect of outliers. The final sample includes 1,402 banks from 82 countries. It contains 1,066 banks from 69 strong-FTR countries and 336 banks from 13 weak-FTR countries.

### 3.2 Variables

We test whether language FTR shapes bank risk-taking. We use the Z-score of each bank to measure bank risk-taking. Z-score measures the insolvency risk and is commonly used in the literature to measure bank risk. Following previous studies (Berger, Klapper and Turk-Ariss, 2009; Houston et al., 2010), we calculate the Z-score as:

$$Zscore = \frac{ROA+CAR}{\delta(ROA)} \quad (1)$$

where ROA is the return on average assets, CAR is the capital asset ratio which is measured as the ratio of the banks' equity to total assets, and δ(ROA) is the standard deviation of the return on average assets calculated over the whole period of the study. Since the Z-score is a highly skewed bank risk measure, we take the natural log of the Z-score following the literature (e.g., Laeven and Levine, 2009) . In the rest of the paper, we will refer to the logged

Z-score as *Z-score*. The Z-score is inversely related to the probability of insolvency for the bank, hence a higher z-score is associated with lower bank risk.

The explanatory variable of interest in our study is the strong-FTR. Specifically, we categorize languages into strong-FTR and weak-FTR based on Chen (2013). Chen (2013) classifies "futureless" languages as weak-FTR and non-weak-FTR languages as strong-FTR. Strong-FTR languages mostly require the obligatory use of future tense even in prediction-based statements.

We create the dummy variable *Strong-FTR* which is equal to one if a bank's headquarters is located in a country categorized as having a strong-FTR language and zero otherwise.

We consider only countries with one FTR language form (i.e. having at least one strong-FTR and one weak-FTR language) for the official languages to ensure proper identification of the language of the bank with one exception.

Countries with multiple languages with different FTR forms generate identification problems. We exclude for instance Belgium, a country with approximately half of the population speaking Flemish (a weak-FTR language) and the other half speaking French (a strong-FTR language) since the vast majority of banks in the sample have their headquarters in the same city, Brussels. So we cannot disentangle based on the headquarters of the bank the FTR language form.

The only exception is Switzerland, which combines both strong (French, Italian) and weak (German) FTR language forms. The reason is that bank headquarters are located in various cities in the country (Zurich, Bern, Geneva, and Lausanne) for which we know the dominant language. Countries with multiple languages but with only one FTR language form do not generate problems. For instance, Canada has two official languages (English and French) but they are both strong FTR languages. So we can associate this form to all Canadian banks.

We consider three bank variables in our model to control for bank-specific characteristics. First, we control for bank size which is measured as the natural logarithm of bank total assets (*Bank Size*). We also include in our model the ratio of loans to total assets (*Loans to Assets*) to control for the structure of assets. Loans are usually considered to be more stable than non-traditional banking activities and as such, we expect banks with higher loans-to-assets ratio to take lower risk (Iannotta, Nocera and Sironi, 2007). Finally, we make

use of the ratio of deposits to total assets (Deposits to Assets) to take into account the structure of funding.

Beyond the bank control variables described above, we also include for the characteristics of the country in line with former cross-country studies looking at the determinants of bank risk-taking measured with the Z-score. The level of economic development is controlled with the log of GDP per capita (*GDP per capita*). Inflation is measured as the annual percentage change in consumer prices (*Inflation*). We also take into account the institutional framework with the legal rights index from the World Bank (*Legal Rights*) and for bank concentration with the Herfindahl index (*Herfindahl Index*).

Finally, we control for continent fixed effects, as different languages within a continent may share similar components and characteristics. For example, the Japan and Korean languages have been influenced by the Chinese language.

Detailed definition of all variables is reported in the Appendix. Table 1 presents the cross-country statistics with the number of banks and the average Z-score for each country in the sample. We interestingly observe that mean Z-score for the banks in strong-FTR countries (3.449) is lower than those in weak-FTR countries (3.532). This first observation suggests higher risk for banks located in strong-FTR countries, which has to be confirmed by our multivariate estimations. Table 2 reports the descriptive statistics of the variables.

### 3.3 Methodology

In this paper, we examine how languages with future tense marking affect time precision beliefs and lead to differences in bank risk.. We therefore formulate our model as;

$$Risk_{ikt} = \alpha + \beta\ \text{strongFTR}_{kt} + \ \delta X_{it} + \phi C_{kt} + \omega_k + \varepsilon_{ikt} \qquad (2)$$

where $Risk$ is the measure of bank risk; $i$ refers to the bank, k to the country and t to the year; $strongFTR$ is a dummy which equals to one if a country or region's dominant language is classified as a strong FTR and zero otherwise; $X$ represents bank-level controls; $C$ is country-level control variables; $\varepsilon_{i,t}$ is the error term; and $\alpha, \beta, \delta$, and $\phi$ are vectors of coefficient estimates. Details of the variables in the regression are explained in the following sections and are summarized in Zak, P., Knack, S., 2001. Trust and growth. Economic Journal 111, 470, 295-321.

## Table 1.
## Cross-country summary statistics

This table provides the number of banks and the average Z-score for each country in the sample.

| Country | Number of Banks | Average Z-score | Country | Number of Banks | Average Z-score |
|---|---|---|---|---|---|
| Panel A: *Strong-FTR language Countries* | | | Panel B*: Weak-FTR language Countries* | | |
| Albania | 2 | 3.812 | Austria | 14 | 3.474 |
| Australia | 19 | 4.33 | Brazil | 67 | 3.443 |
| Azerbaijan | 9 | 2.604 | China | 116 | 3.911 |
| Bahamas | 6 | 3.374 | Denmark | 12 | 2.95 |
| Bahrain | 4 | 4.207 | Finland | 9 | 3.867 |
| Bangladesh | 27 | 3.286 | Germany | 4 | 3.785 |
| Belarus | 4 | 3.094 | Iceland | 2 | 3.158 |
| Belize | 2 | 2.469 | Indonesia | 16 | 3.396 |
| Botswana | 5 | 2.70 | Japan | 76 | 4.308 |
| Bulgaria | 11 | 2.958 | Netherlands | 15 | 3.289 |
| Canada | 37 | 3.783 | Norway | 8 | 3.731 |
| Chile | 10 | 3.763 | Suriname | 3 | 2.793 |
| Colombia | 7 | 3.284 | Sweden | 8 | 3.808 |
| Costa Rica | 5 | 3.977 | | | |
| Croatia | 5 | 3.343 | | | |
| Czech Republic | 8 | 3.681 | | | |
| Dominican Republic | 2 | 4.081 | | | |
| Ecuador | 9 | 3.739 | | | |
| Egypt | 4 | 3.642 | | | |
| France | 26 | 4.04 | | | |
| Gambia | 2 | 3.473 | | | |
| Georgia | 7 | 3.716 | | | |
| Ghana | 8 | 2.295 | | | |
| Greece | 5 | 2.057 | | | |
| Honduras | 2 | 3.997 | | | |
| Hong Kong | 18 | 3.935 | | | |
| Hungary | 12 | 2.399 | | | |
| Iraq | 2 | 4.261 | | | |
| Italy | 19 | 2.988 | | | |
| Jamaica | 3 | 3.146 | | | |
| Jordan | 12 | 4.293 | | | |
| Kuwait | 4 | 3.699 | | | |
| Latvia | 9 | 2.64 | | | |
| Lebanon | 20 | 4.358 | | | |
| Lithuania | 3 | 2.779 | | | |
| Macedonia | 2 | 3.093 | | | |
| Mexico | 18 | 3.591 | | | |
| Morocco | 8 | 4.232 | | | |
| Mozambique | 2 | 3.995 | | | |
| Namibia | 4 | 3.764 | | | |
| New Zealand | 6 | 4.00 | | | |
| Nicaragua | 4 | 3.175 | | | |
| Nigeria | 9 | 2.883 | | | |
| Panama | 22 | 4.327 | | | |
| Poland | 16 | 3.841 | | | |
| Portugal | 8 | 2.653 | | | |
| Qatar | 6 | 3.61 | | | |
| Republic of Korea | 5 | 4.008 | | | |
| Republic of Moldova | 2 | 3.997 | | | |
| Romania | 8 | 2.296 | | | |

| | | | | |
|---|---|---|---|---|
| Russian Federation | 58 | 2.717 | | |
| Saudi Arabia | 8 | 4.709 | | |
| Slovakia | 4 | 4.269 | | |
| Slovenia | 3 | 2.541 | | |
| Spain | 22 | 3.541 | | |
| Thailand | 9 | 3.719 | | |
| Trinidad and Tobago | 2 | 4.634 | | |
| Tunisia | 11 | 3.264 | | |
| Turkey | 18 | 3.52 | | |
| Ukraine | 11 | 3.069 | | |
| United Arab Emirates | 14 | 3.543 | | |
| United Kingdom | 26 | 3.066 | | |
| United States of America | 375 | 3.596 | | |
| Uruguay | 3 | 3.137 | | |
| Venezuela | 2 | 2.172 | | |
| Vietnam | 22 | 3.616 | | |
| Yemen | 2 | 2.698 | | |
| Zambia | 4 | 3.069 | | |
| Mean | | 3.449 | Mean | 3.532 |
| Standard Deviation | | 0.641 | Standard Deviation | 0.423 |

## Table 2.
## Descriptive statistics

This table provides descriptive statistics for the variables used in the estimations. Definitions of variables are reported in the Appendix.

| Variable | N | Mean | Std Dev. | Min | Max |
|---|---|---|---|---|---|
| Strong-FTR | 8,424 | 0.760 | 0.427 | 0 | 1 |
| Z- score | 8,424 | 3.612 | 0.904 | -1.153 | 7.580 |
| Bank size | 8,424 | 15.853 | 1.930 | 9.203 | 22.111 |
| Loans to Assets | 8,424 | 58.209 | 17.646 | 6.047 | 89.873 |
| Deposits to Assets | 8,424 | 70.051 | 18.075 | 4.476 | 93.084 |
| Log (GDP/capita) | 8,424 | 10.040 | 1.045 | 5.946 | 11.543 |
| Inflation | 8,424 | 0.026 | 0.030 | -0.038 | 0.483 |
| Legal Rights | 8,424 | 7.036 | 0.095 | 0 | 12 |
| Herfindahl Index | 8,424 | 0.089 | 0.095 | 0.030 | 0.560 |
| NPL | 7,868 | 4.326 | 6.833 | 0.00 | 49.143 |
| LLR | 8,168 | 3.189 | 3.969 | 0.034 | 32.888 |
| LLP | 8017 | 0.920 | 1.427 | -0.816 | 11.238 |
| δ(ROA) | 8,424 | 0.426 | 0.398 | 0.007 | 3.123 |
| Verb Ratio | 7,357 | 0.605 | 0.310 | 0 | 1 |
| Sentence Ratio | 7,357 | 0.671 | 0.333 | 0 | 1 |

## Table 3.
## Main estimations

This table presents the results of random effects regressions examining the relation between strong-FTR language and bank risk. The dependent variable is Z-score. Definitions of variables are provided in the Appendix. Robust standard errors controlling for heteroscedasticity are reported within parentheses.*, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Strong-FTR | -0.310*** | -0.419*** | -0.311*** | -0.438*** | -0.299*** |
| | (0.056) | (0.062) | (0.059) | (0.065) | (0.068) |
| Bank Size | | -0.127*** | | -0.146*** | -0.158*** |
| | | (0.017) | | (0.019) | (0.019) |
| Loans to Total Assets | | -0.004*** | | 0.003*** | 0.003*** |
| | | (0.001) | | (0.00) | (0.001) |
| Deposits to Total Assets | | 0.003*** | | -0.003*** | -0.004*** |
| | | (0.001) | | (0.000) | (0.001) |
| Log (GDP/capita) | | | 0.002 | 0.066*** | 0.099*** |
| | | | (0.023) | (0.024) | (0.029) |
| Inflation | | | -0.736*** | -0.913*** | -0.859*** |
| | | | (0.168) | (0.159) | (0.158) |
| Legal Rights | | | -0.0002 | -0.002 | -0.002 |
| | | | (0.004) | (0.004) | (0.005) |
| Herfindahl Index | | | 0.168 | 0.165 | 0.190 |
| | | | (0.202) | (0.193) | (0.195) |
| Constant | 3.737*** | 5.753*** | 3.727*** | 5.467*** | 5.075*** |
| | (0.047) | (0.282) | (0.225) | (0.302) | (0.32) |
| Observations | 8,424 | 8,424 | 8,424 | 8,424 | 8,424 |
| R Squared | 0.017 | 0.003 | 0.025 | 0.009 | 0.039 |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Continent FE | No | No | No | No | Yes |

## Table 4.
## Alternative measures of country culture

This table presents the results of random effects regressions examining the relation between strong-FTR language and bank risk. The dependent variable is Z-score. Definitions of variables are provided in the Appendix. Robust standard errors controlling for heteroscedasticity are reported within parentheses.*, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) |
|---|---|---|---|
| Strong-FTR | -0.318*** | -0.267*** | -0.345*** |
| | (0.093) | (0.077) | (0.073) |
| Uncertainty Avoidance | 0.0009 | | |
| | (0.002) | | |
| Long term Orientation | -0.003 | | |
| | (0.002) | | |
| Catholic | | 0.559*** | |
| | | (0.099) | |
| Muslim | | -0.114 | |
| | | (0.108) | |
| Protestant | | -0.168 | |
| | | (0.198) | |
| Buddhist | | 0.253** | |
| | | (0.124) | |
| Trust | | | 1.247*** |
| | | | (0.257) |
| Corruption | | | 0.951*** |
| | | | (0.254) |
| Constant | 5.374*** | 5.168*** | 5.622*** |
| | (0.361) | (0.335) | (0.329) |
| Observations | 7,765 | 8,424 | 7,466 |
| R Squared | 0.052 | 0.06 | 0.012 |
| Bank Controls | Yes | Yes | Yes |
| Country Controls | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| Continent FE | Yes | Yes | Yes |

## Table 5.
## Alternative measures of bank risk

This table presents the results of random effects regressions examining the relation between strong-FTR language and bank risk. The dependent variable is the risk measure at the top of the column. Definitions of variables are provided in the Appendix. Robust standard errors controlling for heteroscedasticity are reported within parentheses.*, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | NPL | δ(ROA) | LLR | LLP |
| Strong-FTR | 1.029 | 0.067 | 1.01 | 0.101 |
| | (0.482) | (0.021) | (0.268) | (0.089) |
| Bank Size | -0.604 | -0.045 | -0.354 | -0.017 |
| | (0.105) | (0.005) | (0.072) | (0.022) |
| Loans to Total Assets | -0.055 | -0.001 | -0.045 | -0.004 |
| | (0.010) | (0.001) | (0.007) | (0.003) |
| Deposits to Total Assets | -0.005 | -0.002 | 0.001 | -0.006 |
| | (0.010) | (0.001) | (0.006) | (0.002) |
| Log (GDP/capita) | -2.055 | -0.054 | -1.446 | -0.393 |
| | (0.274) | (0.013) | (0.165) | (0.048) |
| Inflation | -7.09 | 0.664 | 0.956 | 5.492 |
| | (5.471) | (0.243) | (2.189) | (1.258) |
| Legal Rights | 0.158 | 0.008 | 0.121 | 0.029 |
| | (0.078) | (0.005) | (0.053) | (0.017) |
| Herfindahl Index | -6.289 | -0.179 | -2.702 | -0.569 |
| | ( 1.380) | (0.076) | (0.869) | (0.459) |
| Constant | 36.693 | 1.796 | 24.088 | 5.976 |
| | (3.031) | (0.135) | (1.898) | (0.64) |
| Observations | 7,868 | 8,424 | 8,168 | 8,017 |
| R Squared | 0.256 | 0.145 | 0.317 | 0.215 |
| Year FE | Yes | Yes | Yes | Yes |
| Continent FE | Yes | Yes | Yes | Yes |

## Table 6.
## Alternative measures for future tense reference

This table presents the results of random effects regressions examining the relation between measures for future tense reference and bank risk. The dependent variable is Z-score. Definitions of variables are provided in the Appendix. Robust standard errors controlling for heteroscedasticity are reported within parentheses.*, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Verb Ratio | -0.502*** | -0.521*** | | |
| | (0.109) | (0.122) | | |
| Sentence Ratio | | | -0.508*** | -0.511*** |
| | | | (0.103) | (0.114) |
| Constant | 3.475*** | 5.341*** | 3.516*** | 5.374*** |
| | (0.141) | (0.340) | (0.144) | (0.341) |
| Observations | 7,793 | 7,357 | 7,793 | 7,357 |
| R Squared | 0.111 | 0.052 | 0.113 | 0.053 |
| Year FE | No | Yes | No | Yes |
| Continent FE | No | Yes | No | Yes |

## Table 7.
## Robustness checks

This table presents the results of random effects regressions examining the relation between strong-FTR language and bank risk. The dependent variable is Z-score. Definitions of variables are provided in the Appendix. Robust standard errors controlling for heteroscedasticity are reported within parentheses.*, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | 3-year rolling window | Excluding U.S. | Excluding largest weak-FTR and strong-FTR countries | Excluding Switzerland |
| Strong FTR | -0.132*** | -0.295*** | -0.186** | -0.293*** |
| | (0.065) | (0.072) | (0.086) | (0.068) |
| Constant | 0.373*** | 5.139*** | 4.906*** | 5.030*** |
| | (0.344) | (0.392) | (0.413) | (0.318) |
| Observations | 5,948 | 5,612 | 5,018 | 8,369 |
| R Squared | 0.086 | 0.051 | 0.050 | 0.040 |
| Year FE | No | Yes | No | Yes |
| Continent FE | No | Yes | No | Yes |

# Appendix

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We use the generalized least squares (GLS) random effects (RE) technique. This technique is robust to first-order autoregressive (AR(1)) disturbances (if any) within unbalanced-panels and cross-sectional correlation and/or heteroscedasticity across panels. As language, which is our main variable of interest is time invariant, we cannot estimate the model using fixed effects as it would be absorbed or wiped out in 'within transformation' or 'time-demeaning' process of the variables in fixed effects. Hence, this explains our choice to use the random effects technique.

## 4. Results

### 4.1 Main estimations

We analyze whether future tense marking influences risk-taking behavior of banks. We perform four regressions to consider several sets of control variables. In column (1), we only include the variable Strong-FTR. In columns (2) to (4), we respectively add bank-level control variables, country-level control variables, and all control variables.

Our main finding is the negative and significant coefficient for *Strong-FTR* in all estimations. It means that a strong future time reference is associated with lower values for Z-score. Thus, banks from countries with strong future time reference take more risk than those located in countries with weak future time reference. This conclusion is in line with our hypothesis that to view the future as more distant leads to enhance the risk-taking behaviour of banks.

The economic significance of this result is of interest. When considering the coefficients in the specification with all control variables, we show that the difference between a bank located in a country with strong FTR language and one located in a country with a weak FTR language is associated with a change in Z-score of -0.132. This figure has to be compared to the mean (4.250) and the standard deviation (1.114) of the Z-score for the sample.

With respect to the bank-level control variables, we observe a positive and significant sign for bank size, supporting the view that a large bank size is associated with lower risk. This result is in line with what Berger, Klapper and Turk-Ariss (2009). We also observe significant and positive coefficients for loans to assets and deposits to assets, meaning that

higher shares of loans and deposits on both sides of the balance sheet contribute to reduce bank risk.

When considering country-level control variables, inflation tends to strengthen risk, as seen with its positive and significant coefficient. It accords with what Houston et al. (2010) have found. Income per capita is associated with lower risk, which corroborates the finding from Laeven and Levine (2009) and Houston et al. (2010). Finally *Legal Rights* and *Herfindahl Index* are not significant.

### 4.2 Additional culture measures

Our analysis is focused on the impact of language on bank risk. However language is one characteristic of the culture but not the only one. Culture can be defined as "those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation" (Guiso, Sapienza and Zingales, 2006). As such it includes language but also religion and trust among many other values.

We can then question whether our finding that banks from countries with strong future time reference take more risk is not influenced by another indicator of the culture of a country. We thus aim to rule out this possibility by performing additional estimations in which we control for alternative culture measures. We present these results in Table 4.

#### 4.3.1 *Hofstede Dimensions*

A seminal research in the analysis of culture has been the works from Hofstede (1980, 2001). He has used systematically collected data about a large number of cultures to develop a terminology to characterize cultures through six dimensions. Hofstede classification has been widely adopted to assess the influence of cultural dimensions in finance like financial systems (Kwok and Tadesse, 2006) and corporate risk-taking (Li et al., 2013).

We focus on two dimensions of national culture identified by Hofstede (1980): uncertainty avoidance, and long-term orientation. *Uncertainty Avoidance* measures the tolerance of a society for uncertainty and ambiguity. *Long Term Orientation* which measures the ability of a society to change. Both these indicators come from Hofstede website. These two cultural dimensions are the most closely related to the potential influence of future tense reference. Chen et al. (2017) similarly consider both these Hofstede dimensions to check the robustness of their findings for the relation between future tense reference and corporate cash holdings.

We add both these cultural dimensions in the regression in column 1. We observe that the coefficient of *Strong FTR* remains significantly negative. Hence the impact of future tense reference on bank risk is still observed when Hofstede dimensions are taken into account. In addition, we find that *Uncertainty Avoidance* and *Long Term Orientation* are not significant, suggesting no relation between these dimensions and bank risk.

#### 4.3.2 *Religion*

Religion is a major component of the culture which shapes the norms of societies (Iyer, 2016). A large set of papers have shown how religion can influence financial behaviour of economic agents (Hilary and Hui, 2009; Kumar, Page, and Spalt, 2011; Klein, Turk-Ariss, and Weill, 2017). Thus the differences in bank risk we observe across countries can be driven by religion rather than language features.

We control for religion by adding a set of religion indicators at the country level: Catholic, Protestant, Muslim, and Buddhist. These variables are all dummy variables equal to one if more than 50% of the inhabitants in a country are respectively Catholics, Muslims, Protestants, and Buddhists. Data come from the CIA World Factbook.

The results in column 2 show that religion does not drive our results. We still find a negative and significant coefficient for *Strong FTR*. Interestingly we observe that banks in Catholic countries and in Buddhist countries take more risk while the coefficients for *Muslim* and *Protestant* are not significant. The finding about Catholic countries accords with the finding that Catholics are more risk-averse (Halek and Eisenhauer, 2001).

#### 4.3.3 *Trust and corruption*

Trust and corruption have been shown to influence economic outcomes (Mauro, 1995; Zak and Knack, 2001). In the context of financing decisions, there is evidence that corruption influences loan characteristics (Bae and Goyal, 2009) and bank loan decisions (Fungacova, Kochanova and Weill, 2015) while trust plays a key role in the performance of large organizations (La Porta et al., 1997b) and stock market participation (Guiso, Sapienza and Zingales, 2008).

We take into account trust and corruption in the estimations. *Trust* is measured with the trust index provided La Porta et al. (1997b). *Corruption* is the corruption perception index from Transparency International with higher values associated with lower corruption.

The results are reported in column 3. We find again that the coefficient of *Strong FTR* is significantly negative, meaning that the key finding is not affected by the inclusion of trust

and corruption. We furthermore find out that higher trust and lower corruption are associated with lower bank risk, in line with the expectation.

## 5. Robustness Checks

This section presents a battery of robustness tests. We first use alternative measures for bank risk. We continue with results including alternative measures for future tense reference and complete with additional robustness checks.

### 5.1 Alternative measures of bank risk

First, we use alternative measures for bank risk. We have used Z-score to measure bank risk in our main estimations. Since literature also provides additional indicators for bank risk, we want to check whether our results stand when using these indicators.

To this end, we redo our estimations by using alternatively four measures of bank risk. First, we use the ratio of non-performing loans to gross loans (*NPL*) as our main indicator for credit risk. Second, we utilize the ratio of loan loss reserves to gross loans (*LLR*) as another risk measure. Third, we include the ratio of loan loss provisions to gross loans (*LLP*) as a backward-looking credit risk measure. Finally, we compute the standard deviation of average return on assets ($\delta(ROA)$) on a three-year rolling-window as an alternative risk measure. It has to be stressed that higher values represent greater risk for all four alternative bank risk measures. The results are reported in Table 5.

We find that the coefficient of *Strong FTR* is significantly positive in all estimations aside from a positive but not significant coefficient in the last estimation explaining *LLP*. Therefore we observe that our finding that banks located in countries with strong FTR languages have higher risk-taking is confirmed. Our key finding is therefore robust to the use of alternative measures of bank risk.

### 5.2 Alternative measures for future tense reference

We utilize alternative measures for future tense reference. Chen (2013) has developed two indicators based on word-frequency analysis of text from the web. The verb ratio measures the number of verbs which are grammatically future marked, divided by the total number of future-referring verbs in a country's online weather forecast. The sentence ratio measures the share of sentences regarding the future which contain a grammatical future marker in a country's online weather forecast. The verb and sentence ratios are highly

correlated with the strong-FTR language measure. They are available for a smaller number of observations (7,793 observations vs. 8,424 observations for strong-FTR language measure). We test the influence of both indicators in Table 6. With each indicator, we first perform regressions without control variables, then with control variables. We find that both verb ratio and sentence ratio are significantly negative.

The results with verb ratio and sentence ratio then align with our main estimations and thus provide additional support for our finding that strong future tense reference increases bank risk.

### 5.3 Additional robustness checks

Table 7 reports several robustness checks.

First, we use an alternative way to measure Z-score. We change the denominator of the Z-score by computing the standard deviation of ROA on a three-year rolling window rather than on the whole period of the study. We report the results in column (1). We observe again the negative influence of strong-FTR language on Z-score.

Second, we exclude U.S. from the sample. Chen et al. (2017) point out that this country has a specific status as a "melting pot" with large variation in cultures and languages. As such, we can check if the results stand without this country. The regression is displayed in column (2). We find again a significant and negative coefficient for *Strong FTR*.

Third, we exclude the largest strong-FTR and weak-FTR countries in terms of number of banks from the sample. Both these countries represent a substantial share of the sample and can drive our results. We therefore drop both the largest strong-FTR country (U.S. with 375 banks) and the largest weak-FTR country (China with 116 banks). We report the results in column (3). We still find that the coefficient for *Strong FTR* is negative and significant.

Fourth, we exclude Switzerland. This country is the only one in our sample combining strong-FTR (French, and Italian) and weak-FTR (German) languages. We consider Switzerland in our sample since we were able to carefully check the location of the headquarters of each bank. We can nonetheless check the influence of the exclusion of this country from the sample. The results are reported in column (4). The effect of strong-FTR language on bank risk remains significantly negative.

## 6. Conclusion

In this paper, we analyzed the impact of language on risk-taking behavior of banks. While a large set of determinants of bank risk have been investigated, the influence of language has been ignored until now. Our hypothesis is that strong FTR languages influence banks to take more risk. It accords with the view that a strong-FTR language makes the future feel more distant than the present and as such reduces the perception of potential losses associated with a risky loan. This hypothesis is motivated by the idea that a strong-FTR language makes the future feel more distant than the present.

Our main finding is that language affects bank risk. Our baseline estimations show a positive relation between strong FTR language and bank risk. This conclusion stands when we take into account different culture indicators. It is confirmed in a battery of robustness tests considering various measures of bank risk and of future tense reference and different samples of countries. This evidence is consistent with our prediction. This conclusion supports the view from Chen (2013) that language exerts an impact on economic behavior, which has been confirmed by Liang et al. (2014) and Chen et al. (2017) at the corporate level.

The take-away lesson is that language can explain part of the cross-country differences in bank risk. The implications of our conclusion are numerous. At the country level, it suggests that countries with strong FTR languages should have lower financial stability due to higher risk-taking from banks. Language may therefore contribute explain differences in the frequency of banking crises across countries. At the bank level, we should observe a change in risk-taking behavior for a bank when bank managers with a strong FTR language replace others with a weak FTR language and reversely. The influence of CEO changes on bank risk should thus be considered through the angle of the CEO language. These implications open avenues for further research.

## REFERENCES


Adhikari, B.K., Agrawal, A., 2016. Does local religiosity matter for bank risk-taking? J.CorpFinance 38, 272–293.

Ashraf, B.N., 2017. Political institutions and bank risk-taking behavior. J. Financ. Stab. 29, 13–35.

Bae K.H. and V.K. Goyal, 2009. Creditor Rights, Enforcement, and Bank Loans, Journal of Finance 64, 2, 823-860.

Berger, A., Klapper, L., Turk-Ariss, R., 2009. Bank Competition and Financial Stability. Journal of Financial Services Research 35, 2, 99-118.

Boroditsky, L., 2001. Does language shape thought?: Mandarin and English speakers' conceptions of time. Cognit. Psychol. 43, 1–22.

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

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

Copley, B., 2009. The semantics of the future. Routledge.

Fungacova, Z., Kochanova, A., Weill, L., 2015. Does Money Buy Credit? Firm-Level Evidence on Bribery and Bank Debt. World Development 68, 308-322.

Guiso, L., Sapienza, P., Zingales, L., 2006. Does culture affect economic outcomes? Journal of Economic Perspectives 20, 2, 23-48.

Guiso, L., Sapienza, P., Zingales, L., 2008. Trusting the stock market. Journal of Finance 63, 6, 2557-2600.

Gumperz, J.J., Levinson, S.C., 1991. Rethinking linguistic relativity. Curr. Anthropol. 32, 613–623.

Halek, M., Eisenhauer, J.G., 2001. Demography of risk aversion. J. Risk Insur. 1–24.

Hilary, G., Hui, K.W., 2009. Does religion matter in corporate decision making in America? Journal of Financial Economics 93, 455-473.

Hofstede, G., 1980. Culture's consequences: international differences in work-related values. Sage. Thousand Oaks.

Hofstede, G., 2001. Culture's consequences: Comparing values, behaviors, institutions and organizations across nations. Sage, Thousand Oaks.

Houston, J.F., Lin, C., Lin, P., Ma, Y., 2010. Creditor rights, information sharing, and bank risk taking. J. Financ. Econ. 96, 485–512.

Iannotta, G., Nocera, G., Sironi, A., 2007. Ownership structure, risk and performance in the European banking industry. J. Bank. Finance 31, 2127–2149.

Iyer, S., 2016. The new economics of religion. J. Econ. Lit. 54, 2, 395-441.

Kay, P., Kempton, W., 1984. What is the Sapir-Whorf hypothesis? Am. Anthropol. 86, 65–79.

Klein, P.O., Turk-Ariss, R., Weill, L., 2017. Religiosity vs. well-being effects on investor behavior. Journal of Economic Behavior and Organization 138, 50-62.

Kumar, A., Page, J.K., Spalt, O.G., 2011, Religious Beliefs, Gambling Attitudes, and Financial Market Outcomes, Journal of Financial Economics 102, 671-708.

Kwok, C.C., Tadesse, S., 2006. National culture and financial systems. J. Int. Bus. Stud. 37, 227–247.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 1997a. Legal determinants of external finance. J. Finance 52, 1131–1150.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, Vishny, R.W. 1997b. Trust in large organizations. *American Economic Review*: Papers and Proceedings, 87(2), 333-338.

Laeven, L., Levine, R., 2009. Bank governance, regulation and risk taking. J. Financ. Econ. 93, 259–275.

Li, K., Griffin, F., Yue, H., Zhao, L., 2013. How does culture influence corporate risk-taking? Journal of Corporate Finance 23, 1-22.

Liang, H., Marquis, C., Renneboog, L., Sun, S.L., 2014. Speaking of corporate social responsibility CentER Discussion Paper Series No. 2014-023.

Mauro, P., 1995. Corruption and Growth, Quarterly Journal of Economics 110, 681-712.

Mavisakalyan, A., Weber, C., 2018. Linguistic structures and economic outcomes. Journal of Economic Surveys 32, 3, 916-939.

Pathan, S., 2009. Strong boards, CEO power and bank risk-taking. J. Bank. Finance 33, 1340–1350.

Regier, T., Kay, P., 2009. Language, thought, and color: Whorf was half right. Trends Cogn. Sci. 13, 439–446.
Sapir, E., 1929. The status of linguistics as a science. Language 5, 207. https://doi.org/10.2307/409588
Slobin, D.I., 2003. Language and thought online: Cognitive consequences of linguistic relativity. Lang. Mind Adv. Study Lang. Thought 157, 178.
Sutter, M., Angerer, S., Rützler, D., Lergetporer, P., 2015. The effect of language on economic behavior: Experimental evidence from children's intertemporal choices.
Whorf, B.L., 1956. Language, Thought and Reality. Selected Writing: of Benjamín Lee Whorf. Camb. MA MIT Press.
Winawer, J., Witthoft, N., Frank, M.C., Wu, L., Wade, A.R., Boroditsky, L., 2007. Russian blues reveal effects of language on color discrimination. Proc. Natl. Acad. Sci. 104, 7780–7785.
Zak, P., Knack, S., 2001. Trust and growth. Economic Journal 111, 470, 295-321.

## Table 1.
## Cross-country summary statistics

This table provides the number of banks and the average Z-score for each country in the sample.

| Country | Number of Banks | Average Z-score | Country | Number of Banks | Average Z-score |
|---|---|---|---|---|---|
| Panel A: *Strong-FTR language Countries* | | | Panel B*: Weak-FTR language Countries* | | |
| Albania | 2 | 3.812 | Austria | 14 | 3.474 |
| Australia | 19 | 4.33 | Brazil | 67 | 3.443 |
| Azerbaijan | 9 | 2.604 | China | 116 | 3.911 |
| Bahamas | 6 | 3.374 | Denmark | 12 | 2.95 |
| Bahrain | 4 | 4.207 | Finland | 9 | 3.867 |
| Bangladesh | 27 | 3.286 | Germany | 4 | 3.785 |
| Belarus | 4 | 3.094 | Iceland | 2 | 3.158 |
| Belize | 2 | 2.469 | Indonesia | 16 | 3.396 |
| Botswana | 5 | 2.70 | Japan | 76 | 4.308 |
| Bulgaria | 11 | 2.958 | Netherlands | 15 | 3.289 |
| Canada | 37 | 3.783 | Norway | 8 | 3.731 |
| Chile | 10 | 3.763 | Suriname | 3 | 2.793 |
| Colombia | 7 | 3.284 | Sweden | 8 | 3.808 |
| Costa Rica | 5 | 3.977 | | | |
| Croatia | 5 | 3.343 | | | |
| Czech Republic | 8 | 3.681 | | | |
| Dominican Republic | 2 | 4.081 | | | |
| Ecuador | 9 | 3.739 | | | |
| Egypt | 4 | 3.642 | | | |
| France | 26 | 4.04 | | | |
| Gambia | 2 | 3.473 | | | |
| Georgia | 7 | 3.716 | | | |
| Ghana | 8 | 2.295 | | | |
| Greece | 5 | 2.057 | | | |
| Honduras | 2 | 3.997 | | | |
| Hong Kong | 18 | 3.935 | | | |
| Hungary | 12 | 2.399 | | | |
| Iraq | 2 | 4.261 | | | |
| Italy | 19 | 2.988 | | | |
| Jamaica | 3 | 3.146 | | | |
| Jordan | 12 | 4.293 | | | |
| Kuwait | 4 | 3.699 | | | |
| Latvia | 9 | 2.64 | | | |
| Lebanon | 20 | 4.358 | | | |
| Lithuania | 3 | 2.779 | | | |
| Macedonia | 2 | 3.093 | | | |
| Mexico | 18 | 3.591 | | | |
| Morocco | 8 | 4.232 | | | |
| Mozambique | 2 | 3.995 | | | |
| Namibia | 4 | 3.764 | | | |
| New Zealand | 6 | 4.00 | | | |
| Nicaragua | 4 | 3.175 | | | |
| Nigeria | 9 | 2.883 | | | |
| Panama | 22 | 4.327 | | | |
| Poland | 16 | 3.841 | | | |
| Portugal | 8 | 2.653 | | | |
| Qatar | 6 | 3.61 | | | |
| Republic of Korea | 5 | 4.008 | | | |
| Republic of Moldova | 2 | 3.997 | | | |
| Romania | 8 | 2.296 | | | |

| | | | | |
|---|---|---|---|---|
| Russian Federation | 58 | 2.717 | | |
| Saudi Arabia | 8 | 4.709 | | |
| Slovakia | 4 | 4.269 | | |
| Slovenia | 3 | 2.541 | | |
| Spain | 22 | 3.541 | | |
| Thailand | 9 | 3.719 | | |
| Trinidad and Tobago | 2 | 4.634 | | |
| Tunisia | 11 | 3.264 | | |
| Turkey | 18 | 3.52 | | |
| Ukraine | 11 | 3.069 | | |
| United Arab Emirates | 14 | 3.543 | | |
| United Kingdom | 26 | 3.066 | | |
| United States of America | 375 | 3.596 | | |
| Uruguay | 3 | 3.137 | | |
| Venezuela | 2 | 2.172 | | |
| Vietnam | 22 | 3.616 | | |
| Yemen | 2 | 2.698 | | |
| Zambia | 4 | 3.069 | | |
| Mean | | 3.449 | Mean | 3.532 |
| Standard Deviation | | 0.641 | Standard Deviation | 0.423 |

## Table 2.
## Descriptive statistics

This table provides descriptive statistics for the variables used in the estimations. Definitions of variables are reported in the Appendix.

| Variable | N | Mean | Std Dev. | Min | Max |
|---|---|---|---|---|---|
| Strong-FTR | 8,424 | 0.760 | 0.427 | 0 | 1 |
| Z- score | 8,424 | 3.612 | 0.904 | -1.153 | 7.580 |
| Bank size | 8,424 | 15.853 | 1.930 | 9.203 | 22.111 |
| Loans to Assets | 8,424 | 58.209 | 17.646 | 6.047 | 89.873 |
| Deposits to Assets | 8,424 | 70.051 | 18.075 | 4.476 | 93.084 |
| Log (GDP/capita) | 8,424 | 10.040 | 1.045 | 5.946 | 11.543 |
| Inflation | 8,424 | 0.026 | 0.030 | -0.038 | 0.483 |
| Legal Rights | 8,424 | 7.036 | 0.095 | 0 | 12 |
| Herfindahl Index | 8,424 | 0.089 | 0.095 | 0.030 | 0.560 |
| NPL | 7,868 | 4.326 | 6.833 | 0.00 | 49.143 |
| LLR | 8,168 | 3.189 | 3.969 | 0.034 | 32.888 |
| LLP | 8017 | 0.920 | 1.427 | -0.816 | 11.238 |
| δ(ROA) | 8,424 | 0.426 | 0.398 | 0.007 | 3.123 |
| Verb Ratio | 7,357 | 0.605 | 0.310 | 0 | 1 |
| Sentence Ratio | 7,357 | 0.671 | 0.333 | 0 | 1 |

## Table 3.
## Main estimations

This table presents the results of random effects regressions examining the relation between strong-FTR language and bank risk. The dependent variable is Z-score. Definitions of variables are provided in the Appendix. Robust standard errors controlling for heteroscedasticity are reported within parentheses.*, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Strong-FTR | -0.310*** | -0.419*** | -0.311*** | -0.438*** | -0.299*** |
| | (0.056) | (0.062) | (0.059) | (0.065) | (0.068) |
| Bank Size | | -0.127*** | | -0.146*** | -0.158*** |
| | | (0.017) | | (0.019) | (0.019) |
| Loans to Total Assets | | -0.004*** | | 0.003*** | 0.003*** |
| | | (0.001) | | (0.00) | (0.001) |
| Deposits to Total Assets | | 0.003*** | | -0.003*** | -0.004*** |
| | | (0.001) | | (0.000) | (0.001) |
| Log (GDP/capita) | | | 0.002 | 0.066*** | 0.099*** |
| | | | (0.023) | (0.024) | (0.029) |
| Inflation | | | -0.736*** | -0.913*** | -0.859*** |
| | | | (0.168) | (0.159) | (0.158) |
| Legal Rights | | | -0.0002 | -0.002 | -0.002 |
| | | | (0.004) | (0.004) | (0.005) |
| Herfindahl Index | | | 0.168 | 0.165 | 0.190 |
| | | | (0.202) | (0.193) | (0.195) |
| Constant | 3.737*** | 5.753*** | 3.727*** | 5.467*** | 5.075*** |
| | (0.047) | (0.282) | (0.225) | (0.302) | (0.32) |
| Observations | 8,424 | 8,424 | 8,424 | 8,424 | 8,424 |
| R Squared | 0.017 | 0.003 | 0.025 | 0.009 | 0.039 |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Continent FE | No | No | No | No | Yes |

## Table 4.
## Alternative measures of country culture

This table presents the results of random effects regressions examining the relation between strong-FTR language and bank risk. The dependent variable is Z-score. Definitions of variables are provided in the Appendix. Robust standard errors controlling for heteroscedasticity are reported within parentheses.*, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) |
|---|---|---|---|
| Strong-FTR | -0.318*** | -0.267*** | -0.345*** |
| | (0.093) | (0.077) | (0.073) |
| Uncertainty Avoidance | 0.0009 | | |
| | (0.002) | | |
| Long term Orientation | -0.003 | | |
| | (0.002) | | |
| Catholic | | 0.559*** | |
| | | (0.099) | |
| Muslim | | -0.114 | |
| | | (0.108) | |
| Protestant | | -0.168 | |
| | | (0.198) | |
| Buddhist | | 0.253** | |
| | | (0.124) | |
| Trust | | | 1.247*** |
| | | | (0.257) |
| Corruption | | | 0.951*** |
| | | | (0.254) |
| Constant | 5.374*** | 5.168*** | 5.622*** |
| | (0.361) | (0.335) | (0.329) |
| Observations | 7,765 | 8,424 | 7,466 |
| R Squared | 0.052 | 0.06 | 0.012 |
| Bank Controls | Yes | Yes | Yes |
| Country Controls | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| Continent FE | Yes | Yes | Yes |

## Table 5.
## Alternative measures of bank risk

This table presents the results of random effects regressions examining the relation between strong-FTR language and bank risk. The dependent variable is the risk measure at the top of the column. Definitions of variables are provided in the Appendix. Robust standard errors controlling for heteroscedasticity are reported within parentheses.*, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | NPL | δ(ROA) | LLR | LLP |
| Strong-FTR | 1.029 | 0.067 | 1.01 | 0.101 |
| | (0.482) | (0.021) | (0.268) | (0.089) |
| Bank Size | -0.604 | -0.045 | -0.354 | -0.017 |
| | (0.105) | (0.005) | (0.072) | (0.022) |
| Loans to Total Assets | -0.055 | -0.001 | -0.045 | -0.004 |
| | (0.010) | (0.001) | (0.007) | (0.003) |
| Deposits to Total Assets | -0.005 | -0.002 | 0.001 | -0.006 |
| | (0.010) | (0.001) | (0.006) | (0.002) |
| Log (GDP/capita) | -2.055 | -0.054 | -1.446 | -0.393 |
| | (0.274) | (0.013) | (0.165) | (0.048) |
| Inflation | -7.09 | 0.664 | 0.956 | 5.492 |
| | (5.471) | (0.243) | (2.189) | (1.258) |
| Legal Rights | 0.158 | 0.008 | 0.121 | 0.029 |
| | (0.078) | (0.005) | (0.053) | (0.017) |
| Herfindahl Index | -6.289 | -0.179 | -2.702 | -0.569 |
| | ( 1.380) | (0.076) | (0.869) | (0.459) |
| Constant | 36.693 | 1.796 | 24.088 | 5.976 |
| | (3.031) | (0.135) | (1.898) | (0.64) |
| Observations | 7,868 | 8,424 | 8,168 | 8,017 |
| R Squared | 0.256 | 0.145 | 0.317 | 0.215 |
| Year FE | Yes | Yes | Yes | Yes |
| Continent FE | Yes | Yes | Yes | Yes |

## Table 6.
## Alternative measures for future tense reference

This table presents the results of random effects regressions examining the relation between measures for future tense reference and bank risk. The dependent variable is Z-score. Definitions of variables are provided in the Appendix. Robust standard errors controlling for heteroscedasticity are reported within parentheses.*, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Verb Ratio | -0.502*** | -0.521*** | | |
| | (0.109) | (0.122) | | |
| Sentence Ratio | | | -0.508*** | -0.511*** |
| | | | (0.103) | (0.114) |
| Constant | 3.475*** | 5.341*** | 3.516*** | 5.374*** |
| | (0.141) | (0.340) | (0.144) | (0.341) |
| Observations | 7,793 | 7,357 | 7,793 | 7,357 |
| R Squared | 0.111 | 0.052 | 0.113 | 0.053 |
| Year FE | No | Yes | No | Yes |
| Continent FE | No | Yes | No | Yes |

## Table 7.
## Robustness checks

This table presents the results of random effects regressions examining the relation between strong-FTR language and bank risk. The dependent variable is Z-score. Definitions of variables are provided in the Appendix. Robust standard errors controlling for heteroscedasticity are reported within parentheses.*, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | 3-year rolling window | Excluding U.S. | Excluding largest weak-FTR and strong-FTR countries | Excluding Switzerland |
| Strong FTR | -0.132*** | -0.295*** | -0.186** | -0.293*** |
| | (0.065) | (0.072) | (0.086) | (0.068) |
| Constant | 0.373*** | 5.139*** | 4.906*** | 5.030*** |
| | (0.344) | (0.392) | (0.413) | (0.318) |
| Observations | 5,948 | 5,612 | 5,018 | 8,369 |
| R Squared | 0.086 | 0.051 | 0.050 | 0.040 |
| Year FE | No | Yes | No | Yes |
| Continent FE | No | Yes | No | Yes |

# Appendix

| Variable | Definition |
|---|---|
| ***Dependent Variables*** | |
| Z-score | Measure of bank default risk; *Z-score = (ROA+ CAR)/*$\delta(ROA)$, where ROA is the Return on Average Assets, CAR is the ratio of equity to total assets, and $\delta(ROA)$ is the standard deviation of Return on Average Assets computed over a three-year rolling window period. Source: Orbis Bank |
| NPL | Ratio of non-performing loans to gross loans. Source: Orbis Bank |
| LLR | Ratio of loan loss reserves to gross loans. Source: Orbis Bank |
| LLP | Ratio of loan loss provisions to gross loans. Source: Orbis Bank |
| $\delta(ROA)$ | Three-year rolling-window standard deviation of the return on assets. Source: Orbis Bank |
| ***Language Structure Measures*** | |
| Strong-FTR | Dummy equal to one if a country or regions dominant language is classified as a strong FTR ("Future Time Reference") and zero otherwise. Source: Chen (2013). |
| Verb-Ratio | The number of verbs which are grammatically future marked, divided by the total number of future-referring verbs in a country's online weather forecast. Source: Chen (2013). |
| Sentence-Ratio | The share of sentences regarding the future which contain a grammatical future marker in a country's online weather forecast. Source: Chen (2013). |
| ***Control Variables*** | |
| ***Bank Level*** | |
| Size | Logarithm of total assets. Source: Orbis bank database |
| LOTA | Ratio of loans to total assets. Source: Orbis bank database (%) |
| DEPTA | Ratio of deposits to assets. Source: Orbis bank database (%) |

| | |
|---|---|
| ***Country level*** | |
| GDPPC | Log of real Gross Domestic Product per capita. Source: World Development Indicators |
| GDPG | Growth in the real GDP Per Capita (%). Source: World Development Indicators |
| Inflation | Annual percentage change in consumer prices in a country Source: World Development Indicators |
| Legal Right Index | Index to measure the extent to which the laws in a country protect borrowers and lenders. Source: World Governance Indicators |
| Herfindahl Index | Index to Measure market Concentration: World Governance Indicators |
| French Legal Origin | Dummy equal to one if a bank is from a country with French legal origin. Source: La Porta et al. (1997a) |
| English Legal Origin | Dummy equal to one if a bank is from a country with English legal origin. Source: La Porta et al. (1997a)) |
| German Legal Origin | Dummy equal to one if a bank is from a country with German legal origin. Source: La Porta et al. (1997a)) |
| Scandinavian Legal Origin | Dummy equal to one if a bank is from a country with Scandinavian legal origin. Source: La Porta et al. (1997a) |
| Catholic | Dummy equal to one if the largest percentage of people in a country are Catholics. Source: The World Factbook |
| Protestant | Dummy equal to one if the largest percentage of people in a country are Protestants. Source: The World Factbook |
| Muslim | Dummy equal to one if the largest percentage of people in a country are Muslims. Source: The World Factbook |
| Corruption | Index indicating the perceived level of public sector corruption in a country. Source: Transparency International |
| Uncertainty avoidance | Index to measure how a society feels threatened by uncertain situations. Source: Hofstede Website |
| Long-term orientation | Index to measure the long-term orientation of a society. Source: Hofstede Website |
| Trust | Index to measure trust. Source: La Porta et al (1997b) |