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National culture and corporate risk-taking around the world

Bart Frijns [a,b,*], Frank Hubers [a], Donghoon Kim [c], Tai-Yong Roh [d], Yahua Xu [e]

[a] Open Universiteit, the Netherlands
[b] Auckland University of Technology, New Zealand
[c] KAIST College of Business, South Korea
[d] Liaoning University, China
[e] Central University of Finance and Economics, China

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ABSTRACT

This paper examines the effect of national culture on corporate risk-taking worldwide. Specifically, we focus on one particular cultural trait – Individualism – a culture dimension linked to risk-taking and overconfidence. Using a sample of 48 countries from 1998 to 2019 (a total of 111,697 firm-year observations), we document a positive relationship between Individualism and corporate risk-taking. This result is robust to potential endogeneity concerns, alternative default horizons, an alternative measure for corporate risk-taking, and alternative measures of Individualism.

1. Introduction

A critical decision that a firm's manager needs to make is how much risk they wish the business to be exposed to. Risk-taking is crucial in running a profitable business, but risk can also lead to corporate distress, which can hamper the firm in optimally running its operations. Thus, managers need to determine how much risk they are willing to take, a decision that is driven by their appetite for risk-taking. We address how national culture affects corporate risk-taking based on the notion that cultural attributes affect a manager's behavior and incentives.

National culture has been shown to affect financial decision-making in many contexts (e.g., Karolyi (2016) and Hens, Rieger, and Wang (2020) for an overview). Culture can explain some of the cross-country variations we observe in corporate finance practices, such as dividend policy (Shao, Kwok, & Guedhami, 2010), CEO remuneration (Tosi & Greckhamer, 2004), corporate governance system (Breuer & Salzmann, 2012), and corporate acquisition activity (Frijns, Gilbert, Lehnert, & Tourani-Rad, 2013). In addition, cultural differences can explain the degree of foreign business operations (Ahern, Daminelli, & Fracassi, 2015; Lim, Makhija, & Shenkar, 2016). Even within countries, the behavior of corporate decision-makers is affected by cultural heritage (e.g., Pan, Siegel, & Wang, 2020).

This paper investigates how national culture affects corporate risk-taking in a global setting. Specifically, for a sample from 1998 to 2019, covering 16,396 firms from 48 countries (a total of 111,697 firm-year observations), we examine the relationship between Individualism (a cultural dimension linked to risk-taking and overconfidence) and corporate risk-taking of firms. We measure a firm's

* Corresponding author at: P.O. Box 2960, 6401 DL Heerlen, the Netherlands.
E-mail address: bart.frijns@ou.nl (B. Frijns).

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corporate risk-taking by using firm-level data on default risk from the Credit Research Initiative database of the National University of Singapore (NUS).[1] This measure of default risk integrates various traditional risk-taking measures, such as financial and operational risks, and thus provides an omnibus measure of corporate risk-taking. Our results show a significant, positive relationship between the cultural dimension of Individualism and corporate risk-taking. This finding supports the argument that individualistic cultures promote self-focus and overconfidence, which results in risk-taking. This relationship is robust when we address potential endogeneity issues and is robust to alternative corporate risk and individualism measures. Overall, our results demonstrate that culture is essential in corporate risk-taking.

Our paper relates to several other studies that analyze the effect of culture on corporate risk-taking. For instance, Li, Griffin, Yue, and Zhao (2013) focus on volatility in ROA and R&D, which is a measure for the degree of operational risk-taking by the firm. They report that Individualism is positively related to operational risk-taking. Chui, Lloyd, and Kwok (2002) and Zheng, El Ghoul, Guedhami, and Kwok (2012) focus on financial risk-taking by looking at the impact of culture on capital structure and debt maturity decisions, respectively. They report that Individualism (or in the case of Chui et al. (2002), a related inverse measure called Conservatism) results in greater leverage (in more conservative societies, debt ratios are lower) and that firms in more individualistic countries use more long-term debt financing. We contribute to these studies by relying on an omnibus measure of financial distress, namely the Probability of Default. This measure incorporates operational and financial risk-taking and thus captures a firm's overall risk.

We further contribute to the growing literature on culture and finance (Karolyi, 2016). This literature has demonstrated the pervasive role of culture in corporate decision making (Ahern et al., 2015; Pan et al., 2020) and investment decision making (Beugelsdijk & Frijns, 2010; Cheon & Lee, 2018; Chui, Titman, & Wei, 2010). We contribute to this literature by documenting the role of national culture in overall corporate risk-taking.

The remainder of this paper is structured as follows. Section 2 introduces the corporate risk-taking measure, discusses the relevant culture and finance literature, and motivates our hypotheses. Section 3 introduces the data and presents some summary statistics. In Section 4, we present the results of our paper. Finally, we conclude in Section 5.

2. Background and literature

This section introduces and discusses some properties of the corporate risk-taking measure we employ in this paper, the Probability of Default. We then continue by discussing the relevant culture and finance literature. Subsequently, we motivate the hypothesis we aim to test.

2.1. Corporate risk-taking: the probability of default

We rely on the Probability of Default (PD) to measure corporate risk-taking. Accurately measuring default risk is essential to investors to determine their expected return and for corporations when deciding on future investments, hedging practices, etc. There are several conventional approaches for measuring default risk. Among these are measures based on historical data such as Altman's (1968) *Z*-score or forward-looking measures such as the PD metric of Merton (1974).[2] In this paper, we employ a modified version of Merton's (1974) PD metric. The idea behind Merton's PD metric is that it treats the firm's equity as a call option on the underlying value of the firm (*V*). The option's strike price is the firm's debt level (i.e., when the value of the firm is less than the value of debt, the equity value is zero, and the option expires worthless). Using the Black-Scholes formula, we can write the equity of the firm as:

$$E = VN(d_1) - De^{-rT}N(d_2), \tag{1}$$

where *E* is the firm's equity value, *D* is the value of debt, *N(.)* is the cumulative normal density function, *r* is the risk-free rate, and *T* is the time to maturity.

The Distance to Default (*DD*) is then computed as d_1 where the risk-free rate is replaced with the expected growth rate of the firm's assets, μ, i.e.,

$$DD = \frac{ln\left(\frac{V}{D}\right) + \left(\mu + 0.5\sigma_V^2\right)T}{\sigma_V}, \tag{2}$$

and PD is calculated as $PD = N(-DD)$.

Eq. (2) shows that DD, and thus PD, is a function of three factors the firm can exert control over: 1. the leverage of the firm (V/D); 2. the expected return on assets (μ); 3. the volatility of the firm value (σ_V). Hence, the PD measure is an omnibus metric that captures

[1] The database is managed by NUS's Risk Management Institute (RMI), covering over 80,000 exchange-listed global firms with sample horizons from 1 month to 5 years.

[2] An alternative forward-looking approach is to use Credit Default Swaps (CDSs) as proxies for corporate default risk (e.g., Dodd et al., 2021). The limitation of CDS working as credit risk proxy is limited data availability especially in emerging economies and for small firms. The PD metric we employ can be computed for virtually any listed company (indeed the CRI database we employ covers a wide range of countries and various sizes of firms).

corporate risk-taking in an integrated sense.

2.2. Culture and finance

Classical economists have long ignored the influence of culture in understanding individual decision-making. They took individual preferences as a given and were less interested in its determinants (Fehr & Hoff, 2011). However, the past decades show an increased academic interest in investigating personal attributes that affect decision-making and preferences, including emotions (Conte, Levati, & Nardi, 2018; Fehr-Duda, Epper, Bruhin, & Schubert, 2011), religion (Benjamin, Choi, & Fisher, 2016; Jiang, Jiang, Kim, & Zhang, 2015), and culture (e.g., Benjamin, Choi, & Strickland, 2010; Fehr & Hoff, 2011; Li et al., 2013).

National culture is regarded as a set of values and beliefs that people within a society pass on relatively unchanged from one generation to the next (Guiso, Sapienza, & Zingales, 2015). Given the pervasiveness and persistence of culture, many authors have argued that national culture affects economic behavior (e.g., Guiso, Sapienza, & Zingales, 2009) and financial behavior (Karolyi, 2016). Experimental evidence suggests that culture affects a variety of economic preferences. For example, lab experiments indicate that culture affects people's attitudes towards risk, time preference, and altruism (Benjamin et al., 2010). Large-scale global surveys also show that the degree of risk aversion and time preferences are affected by cultural factors (Rieger, Wang, & Hens., T., 2015; Wang, Rieger, & Hens, 2016). Li et al. (2013) show that national culture can affect corporate risk-taking. Many studies indicate that national culture affects financial decision-making and outcomes, both in investments and corporate finance. From an investment perspective, we know that cultural attributes affect stock market participation (e.g., Breuer, Riesener, & Salzmann, 2014; Rieger, 2020), asset allocation (Anderson, Fedenia, Hirschey, & Skiba, 2011; Beugelsdijk & Frijns, 2010), and investment strategies of investors (Cheon & Lee, 2018; Chui et al., 2010) among others. From a corporate perspective, we see that culture also has a pervasive impact on corporate decision-making and corporate outcomes. Culture affects the attitudes of CEOs towards mergers and acquisitions, for instance (Ahern et al., 2015; Frijns et al., 2013; Pan et al., 2020). In addition, it affects decisions related to the financial activities of the firm, such as the distribution of dividends (Shao et al., 2010) and trade credit provision (El Ghoul & Zheng, 2016). In addition, culture affects the corporate governance system of countries (Breuer & Salzmann, 2012).

This study investigates how national culture affects corporate risk-taking. Our measurement of culture builds on Hofstede (2001), who defines culture as the "collective programming of the mind that distinguishes the members of one group or category of people from another" (2001, p. 9). Hofstede (2001) operationalizes national culture by dividing it into five distinct dimensions or 'traits.' We hypothesize that culture, and in particular the Individualism dimension of culture, is relevant to corporate risk-taking. Individualism (IDV) describes the level of preference for tight social frameworks in a country: Individualistic societies prefer loosely-knit frameworks where everyone is expected to take care of themselves primarily, while collectivistic societies show a preference for a society in which individuals can expect their members of a particular in-group to look after them. The index is based on a survey in a multinational company (IBM), collected in about 30 countries (later expanded to almost 80 countries Hofstede, Hofstede, and Minkov (2010)). This operationalization allows for isolating the effect of certain cultural traits on firm behavior in a cross-country setting.

Hofstede's indices are not uncontroversial. The framework has been criticized, among others, for its simplification of the concept of culture and the apparent arbitrary choice of dimensions and its external validity (Baskerville, 2003; Shaiq, Khalid, Akram, & Ali, 2011). Alternative culture frameworks, like the Global Leadership and Organizational Behavior Effectiveness (GLOBE) and the World Values Survey (WVS), also contain dimensions similar to Hofstede's IDV. We will use these in our sensitivity analysis to test the robustness of our results.

2.3. Hypotheses

The cultural dimension of Individualism captures variations across societies concerning their focus on the individual versus the collective. In individualistic societies, success and failure are attributed more to the individual than to the collective. In addition, in individualistic societies, individuals are rewarded for personal success. For instance, in a global sample, Tosi and Greckhamer (2004) document a positive relationship between Hofstede's (2001) individualism score and a CEO's proportion of variable pay to total pay. These results were confirmed more recently by Bryan, Nash, and Patel (2015). Such a focus on individual reward in individualistic societies encourages risk-taking, and if successful risk-taking is rewarded, we could expect a selection process to occur, where in more individualistic countries managers with greater risk appetite rise to the top. Hence, we would expect managers in individualistic countries to have a greater risk appetite. In addition, since risk-taking is rewarded, we would expect managers to continue to take risks. This increased risk-taking can manifest itself in various ways, through debt structure (Zheng et al., 2012), capital structure decisions (Chui et al., 2002), increased corporate risk-taking (Li et al., 2013), and corporate investment (Shao, Kwok, & Zhang, 2013). Increased risk-taking in all these dimensions would lead to increases in the probability of default, as defined in Section 2.1.

In addition to a direct relationship between Individualism and risk-taking, we also see an indirect channel through overconfidence. The increased focus on individual reward for success arguably leads to a self-attribution bias (Heine, Lehman, Markus, & Kitayama, 1999; Markus & Kitayama, 1991), which induces overconfidence. Indeed, several recent studies make the connection between Individualism and overconfidence and document an impact on financial decision-making and outcomes (e.g., Cheon & Lee, 2018; Chui et al., 2010; Dang, Faff, Luong, & Nguyen, 2019; Dou, Truong, & Veeraraghavan, 2016). This individualism-induced overconfidence can lead to increased risk-taking, manifesting in a higher default probability.

3. Data

This section presents the data employed in this study. We first discuss the Probability of Default (PD) data used in this study. Subsequently, we discuss the Individualism score, followed by the various control variables. We then present summary statistics of our data.

3.1. Probability of default

The dependent variable we use in this study is the Probability of Default (PD). We obtain firm-level PD data from the Credit Research Initiative (CRI) database of the National University of Singapore.[3] The CRI maintains a global database of estimates of corporate default risk. The PD measure CRI computes is based on the forward intensity model Duan, Sun, and Wang (2012) proposed using a set of macro-financial and firm-specific variables, including distance to default.[4] One important highlight of the PD measure is that it accounts for both level and trend effects (Duan et al., 2012).

We obtained PD data from the CRI database for 16,936 firms in 48 countries. PD estimates are computed for various horizons (1, 3, 6, 12, 24, 36, and 60 months), but we focus on a 1-year horizon as this is the most common horizon focused on (Black, Correa, Huang, & Zhou, 2016; Dodd, Kalimipalli, & Chan, 2021; Duan & Li, 2021; among others). We confirm in our robustness tests that our results also hold for other horizons. Although PD estimates are available monthly, we restrict our analysis to annual observations, as many control variables are available annually. Specifically, we focus on the PD estimate of June each year to ensure that all financial data that we match will be publicly available (e.g., Fama & French, 1993, 2015). Again, our results are robust to using monthly data with annual controls. Our sample period runs from 1998 to 2019, resulting in 111,697 firm-year observations after removing observations with missing values. Additionally, we winsorize all variables at the 1% level.

3.2. Individualism

The primary culture framework we employ is that of Hofstede (2001). Hofstede originally proposed four culture dimensions: Individualism, the degree to which people in a society focus on the role and importance of the "self"; power distance, the degree to which people within a society accept hierarchical differences; uncertainty avoidance, the degree to which people in a society are comfortable with dealing with uncertain and ambiguous situations; and masculinity, the degree to which a society promotes competitiveness and assertiveness. Later, Hofstede added two additional dimensions: Long-term orientation; and indulgence vs. restraint. As highlighted in the previous section, we focus on the dimension of Individualism (IDV). Country scores on the various culture dimensions are obtained from Geert Hofstede's website for all 48 countries in our sample. These scores are assumed to be time-invariant.[5]

Although Hofstede constructed his original culture scores based on interviews conducted in the late 1960s, early 1970s, these culture scores are still commonly used. Culture is persistent over time, and while scores on Individualism have increased over time, relative differences between countries have remained relatively stable over time (see, Beugelsdijk, Maseland, & Van Hoorn, 2015). However, to assess the robustness of our results to the choice of a particular culture framework, we consider alternative culture scores for IDV, based on GLOBE (House, Hanges, & Javidan, 2004) and the most recent waves of the World Value Surveys.

3.3. Control variables

In our analysis of the relation between PD and the cultural dimension of Individualism, we control for various firm- and country-level variables. Specifically, we control for financial constraints and growth opportunities using several firm-level variables, including debt ratio, cash and short-term investment, firm size, dividends, net working capital, intangible assets, R&D expenditure, and Tobin's Q. At the country level, we control for legal institutions (shareholder and creditor protection), financial market development proxied by stock and credit market development, economic growth (GDP growth), and political rights. Appendix A provides detailed variable definitions and data sources.

3.4. Summary statistics

In Table 1, we provide descriptive statistics per country. We report the number of firms per country in our sample, summary statistics on PD, and Hofstede's (2001) culture scores for the IDV dimension. First, looking across our set of countries, we observe considerable variation in the number of firms per country. As expected, the countries with the largest number of firms are the US (5615), followed by China (3003), and Japan (2496). Countries with the lowest number of firms in our sample are the Slovak and

[3] The database is managed by NUS's Risk Management Institute (RMI), covering over 80,000 exchange-listed global firms with sample horizons from 1 month to 5 years. See: https://nuscri.org/

[4] Distance to default (DD) is widely employed as a proxy for a firm's credit quality, estimated by using Merton (1974)'s structural model. Notably, DD data provided by CRI also include financial firms which is an important sector of the economy, while most academic studies generally exclude financial firms.

[5] https://geerthofstede.com/research-and-vsm/dimension-data-matrix/

Table 1
Descriptive statistics by country.

Country	#firms	PD Mean (bps)	PD Median (bps)	St. Dev. (bps)	IDV
Argentina	5	31.51	17.73	30.44	46
Australia	325	29.25	5.49	102.21	90
Austria	51	20.69	9.91	42.40	55
Belgium	61	18.60	7.30	39.97	75
Brazil	76	36.52	14.91	58.56	38
Canada	392	75.98	14.39	212.39	80
Switzerland	121	19.74	6.30	54.84	68
Chile	30	10.98	2.62	27.82	23
China	3003	63.88	40.09	99.17	20
Colombia	4	4.95	3.97	4.08	13
Czech Republic	4	66.47	30.30	104.08	58
Germany	364	24.44	9.00	81.51	67
Denmark	30	58.31	7.94	399.69	74
Spain	57	13.37	5.72	26.81	51
Finland	73	32.16	19.86	39.86	63
France	264	25.01	9.40	58.48	71
United Kingdom	428	25.93	9.01	124.91	89
Greece	82	46.87	20.64	94.81	35
Hong Kong	39	19.35	8.72	30.32	25
Croatia	5	11.78	4.86	16.80	33
Hungary	10	9.99	4.99	13.37	80
Indonesia	53	19.05	6.41	30.69	14
India	931	113.83	55.60	194.63	48
Ireland	14	16.44	5.28	32.07	70
Israel	124	21.03	8.54	92.71	54
Italy	92	23.64	10.05	65.09	76
Japan	2496	13.63	5.11	33.91	46
Morocco	4	9.60	6.44	13.12	46
Mexico	11	19.74	11.13	33.80	30
Malaysia	248	31.14	8.43	80.69	26
Netherlands	78	29.22	10.12	66.34	80
Norway	71	26.48	14.66	34.00	69
New Zealand	22	6.72	0.605	30.39	79
Pakistan	37	69.90	24.50	114.33	14
Peru	9	16.46	3.90	27.35	16
Philippines	38	19.09	10.85	27.25	32
Poland	111	31.05	15.66	93.60	60
Portugal	13	17.67	9.23	20.46	27
Romania	9	22.91	12.28	28.52	30
Russia	34	49.07	32.31	51.06	39
Singapore	172	26.12	11.82	41.33	20
Slovak Republic	2	16.62	16.62	23.04	52
South Korea	992	17.27	5.60	40.63	18
Sweden	110	31.29	14.93	60.26	71
Thailand	34	13.26	4.42	19.25	20
Turkey	99	19.64	13.05	22.11	37
United States	5615	69.71	8.64	279.91	91
South Africa	92	39.42	12.68	118.86	65

Note: This table reports descriptive statistics on the probability of default (PD) per country along with Hofstede's (2001) individualism (IDV) scores.

Czech Republic, Columbia, and Morocco, with 2, 4, 4, and 4 firms, respectively. Naturally, the number of firms per country is a function of the size of the local market and the development of the economy. When we consider the average PD per country (reported in basis points), we observe that this average is low, i.e., default risk is low, on average. However, we observe quite some variation at the averages per country. The highest average PD over the sample is for India (113.83), followed by Canada (75.98), Pakistan (69.90), and the US (69.71). The lowest PD is observed for Colombia (4.95), New Zealand (6.72), and Morocco (9.60). We observe that Anglo-Saxon countries rank highest on this for the Individualism dimension. The US has the highest IDV score (91), followed by Australia (90) and the United Kingdom (89). Countries scoring lowest on the individualism dimension are Colombia (13), Indonesia (14), and Pakistan (14).

In Table 2, we report summary statistics over the full sample. Over the full sample, we observe that the average PD is 47.47 basis points. This relatively low average comes with a standard deviation of 185.64, showing substantial variation in PD across firms and over time. For the IDV measure, we observe considerable variation within the sample with 5 and 95 percentile values at 20 and 91, respectively. We have reasonable averages and percentile values for the other control variables that suggest little extreme observations.

Table 2
Descriptive statistics for the full sample.

	Mean	Median	Std. Dev.	Perc. 5%	Perc. 95%
PD (basis points)	47.47	9.72	185.64	0.060	177.12
IDV	61.68	51	27.02	20	91
UAI	59.96	46	23.89	30	92
PDI	52.23	54	16.16	35	80
MAS	68.37	62	18.13	39	95
Log(Total Assets)	19.74	19.63	1.92	16.69	23.20
Tobin's Q	2.20	1.35	7.12	0.664	6.33
Debt/Tot. Assets	0.461	0.455	0.292	0.118	0.828
Dividends/Tot. Assets	0.014	0.0068	0.024	0.000	0.053
Cash Flow/Tot. Assets	0.063	0.079	0.243	−0.269	0.303
Intangibles/Tot. Assets	0.101	0.027	0.152	0.000	0.457
Stock Market/GDP (/1000)	102.22	100.63	57.64	45.52	153.44
Credit Market/GDP (/1000)	151.83	162.60	40.55	51.87	191.70
Log(GDP)	17.19	17.61	0.954	14.55	17.80
GDP Growth	0.021	0.019	0.024	−0.011	0.063
Shareholder Rights Index	3.51	3	1.15	1	5
Credit Rights Index	1.71	2	0.766	1	3
Political Rights Index	1.85	1	1.87	1	7

Note: This table reports descriptive statistics on the probability of default (PD) per country along with Hofstede's (2001) individualism (IDV) scores.

4. Results

In this section, we present the results of our analysis. We first present our main results using a regression model of PD on IDV and a set of control variables. Following our main regression analysis, we conduct a battery of robustness tests, including an instrumental variables analysis, an analysis where we look at PDs with different horizons as an alternative measure for PD, and analyses based on alternative measures for Individualism.

4.1. Main results

For our main analysis, we rely on an OLS regression of PD on IDV and the set of control variables introduced in Section 3.3. Specifically, we run the regression,

$$PD_{it} = \alpha + \beta IDV_i + \boldsymbol{\gamma}\, \boldsymbol{Controls_{it}} + \delta\eta_j + \lambda\tau_t + \varepsilon_{it}, \tag{4}$$

where PD_{it} is the Probability of Default measure for firm i in June of year t, IDV_i is Hofstede's (2001) individualism score, $\boldsymbol{Controls_{it}}$ is a vector containing the firm- and country-level control variables introduced in Section 3.3 as well as the other culture scores of Hofstede (2001). We further control for fixed effects at the industry, η_j, and year level, τ_t, where j denotes the industry that a firm belongs to. We cluster our standard errors at the firm level.

Table 3 presents the main results. Column (1) shows the OLS estimates of our main model, with the cultural trait of IDV as the main independent variable excluding any control variables. Column (2) shows the results with IDV as the main independent variable and includes all controls except the other culture scores. Column (3) presents the results for the effect of IDV on PD, where we include all control variables and the country scores on the other three cultural dimensions proposed by Hofstede (2001). The results are consistent with our predictions. When IDV is included on its own, we observe a positive coefficient that is significant at the 1% level, which means that higher levels of Individualism in a country translate into higher default risk of firms in that country. This finding is in line with our hypothesis that IDV, through increased risk-taking incentives, focuses on self-achievement or overconfidence, which leads to increased risk-taking, which is reflected in an increased corporate risk-taking. This result maintains after the inclusion of additional control variables in Column (2) and the addition of the three other culture dimensions of Hofstede (2001).

For the firm-level control variables (Columns (2–3)), we observe that they have the expected signs. For size (log*(Assets)*), we observe a negative coefficient, suggesting that larger firms have lower default risk. Leverage (*Debt/Tot. Assets*) is positively related to default risk. This finding aligns with expectations, as more leveraged firms have an increased risk profile and a higher probability of default. We observe a negative relation between dividends (*Dividends/Tot. Assets*) and default risk suggesting that firms that distribute more cash to shareholders have lower default risk. This result is also expected since high dividends would signal good performance of a firm. We observe a positive relationship between intangibles and default risk. This positive relation could be explained by the difficulty of using intangibles as collateral and capitalizing on intangible assets in case of default.

At the country level, we observe that countries with relatively larger stock markets have firms with higher default risk. This finding could be explained by larger stock markets indicating relatively easier access to capital, leading to higher levels of corporate risk-taking. Larger economies are populated by firms with relatively lower default risk, and economies that grow faster have higher default risk. Combining these results suggests a link between a country's stage of development and the default risk of companies within such a country. Finally, we see a negative relationship between default risk and shareholder rights protection, default risk, and creditor rights protection. Thus, corporate risk-taking reduces when shareholders or creditors have stronger rights and can better enforce their

Table 3
Main Regression Results.

Variable	PD	PD	PD
Intercept	20.40***	502.71***	527.71***
	(14.11)	(17.64)	(18.26)
IDV	0.439***	0.673***	0.251***
	(15.36)	(9.95)	(2.58)
UAI			−0.437***
			(−6.63)
PDI			−0.049
			(−0.67)
MAS			0.015
			(0.48)
log(Total Assets)		−7.01***	−6.86***
		(−7.90)	(−7.79)
Tobin's Q		−0.967	−0.970
		(−1.14)	(−1.14)
Debt/Tot. Assets		103.69***	103.94***
		(2.82)	(2.82)
Dividends/Tot. Assets		−441.34***	−435.33***
		(−4.82)	(−4.74)
Cash Flow/Tot. Assets		−8.76	−8.77
		(−0.32)	(−0.32)
Intangibles/Tot. Assets		19.98***	18.43**
		(2.63)	(2.44)
Stock Market/GDP		0.065***	0.040***
		(7.32)	(5.39)
Credit Market/GDP		0.009	0.012
		(0.45)	(0.57)
log(GDP)		−21.55***	−19.04***
		(−14.49)	(−12.33)
GDP Growth		335.42***	261.61***
		(8.58)	(6.74)
Share Rights Index		−4.29***	−5.01***
		(−4.14)	(−3.70)
Credit Rights Index		−3.84***	−6.04***
		(−4.60)	(−6.04)
Political Rights Index		1.76**	−3.28**
		(2.18)	(−2.17)
Industry and Year FE	NO	YES	YES
N	111,697	111,697	111,697
R^2	0.004	0.069	0.071

Note: This table reports our model's regression results that relate PD to IDV and UAI and a set of control variables. We measure PD annually in June. Standard errors are clustered at the firm level, and we report *t*-statistics in parentheses. *, **, ***, indicate significance at the 10%, 5%, and 1% levels, respectively.

claims on firms in particular countries.

When we consider the other dimensions of Hofstede (2001) in Column (3), we observe a significant negative effect of the Uncertainty Avoidance (UAI) score, while Power Distance (PDI) and Masculinity (MAS) are insignificant. One could indeed argue that Uncertainty Avoidance, to some extent, captures the risk-avoiding behavior of managers.[6] Overall, our analysis shows a positive effect of IDV on PD, which is robust to the inclusion of various control variables.

4.2. Endogeneity

Although we do not expect a reverse causality in the relationship between culture and corporate risk-taking, we may still be facing other endogeneity issues, such as errors-in-variables or an omitted variables bias. For example, there may be a selection effect caused by firms with a specific preference for risk-taking that might also prefer certain cultural characteristics and consider this in their decision to settle in a particular country. Moreover, Individualism may correlate with unobserved cultural traits that may affect corporate risk-taking. To ensure that our results are robust to any remaining endogeneity concerns, we conduct an Instrumental Variables (IV) regression. For this, we employ a commonly used instrument for IDV based on genetic distance (see Nash & Patel, 2019).

As an instrument for Individualism, we focus on the genetic distance relative to the most individualistic country, according to Hofstede (2001), being the US. Genetic distance data are based on Spolaore and Wacziarg (2009). They use genetic distances based on allele frequencies observed from blood samples (alleles are a particular form taken by genes reflecting specific DNA sequences). The allele frequencies are obtained from Cavalli-Sforza, Menozzi, and Piazza (1994). What is specific about these allele frequencies is that

[6] We note, however, that the negative effect of Uncertainty Avoidance is not robust in further analyses we conduct.

Table 4
Probability of default and culture: instrumental variables approach.

Variable	First-stage	Second-stage
	IDV	PD
Genetic Distance	−0.030***	
	(−7.65)	
Intercept	77.44*	399.13***
	(1.86)	(5.19)
IDV		0.926***
		(5.99)
log(Total Assets)	-0.22	−6.74**
	(−1.47)	(−2.34)
Tobin's Q	0.00	−0.98
	(0.25)	(−0.88)
Debt/Tot. Assets	0.36	103.40***
	(0.65)	(7.64)
Dividends/Tot. Assets	33.78	−455.00***
	(1.20)	(−4.81)
Cash Flow/Tot. Assets	−0.47	−8.54
	(−1.00)	(−1.26)
Intangibles/Tot. Assets	7.77	12.94
	(1.44)	(1.36)
Stock Market/GDP	0.02	0.04
	(0.79)	(1.00)
Credit Market/GDP	0.11***	−0.00
	(3.78)	(−0.05)
log(GDP)	0.32	−20.46***
	(0.15)	(−7.83)
GDP Growth	0.81	330.96**
	(0.01)	(2.31)
Share Rights Index	−1.804	−0.666
	(−0.89)	(−0.22)
Credit Rights Index	−0.742	−3.253
	(−0.24)	(−1.25)
Political Rights Index	−5.25***	5.42***
	(−3.84)	(2.90)
F-stat	103.1	
Industry and Year FE	YES	YES
N	111,697	111,697
R^2	0.9192	0.0696

Note: This table reports Instrumental Variables regression results for our model that relates PD to IDV and UAI and a set of control variables. We measure PD annually in June. For IDV, we use genetic distance relative to the US as our instrument. For UAI, we use a dummy for Protestant as the main religion as our instrument. Standard errors are clustered at the firm level, and we report *t*-statistics in parentheses. *, **, ***, indicate significance at the 10%, 5%, and 1% levels, respectively.

they reflect neutral markers within DNA, i.e., genetic variations that change randomly and are not related to the survival or fitness of people. The genetic distance measure then essentially becomes a measure of how long two populations have been separated from each other. Genetic distance fulfills the relevance criteria for an instrumental variable for IDV, being significantly correlated with Individualism (Gorodnichenko & Roland, 2011). It is also unlikely that allele frequencies will correlate with corporate risk-taking via other means than through culture.

In Table 4, we report the results for the IV regression for Individualism (left columns). For the first-stage regression, we observe that genetic distance is negative and highly significant, i.e., a country with a greater genetic distance to the US has a lower individualism score. The *F*-statistic for this instrument is 103.1, well above the threshold of 10 as suggested by Stock and Yogo (2005). Hence, the first-stage results show that genetic distance affects the level of Individualism in a country, making it a valid instrument for the second stage.

Column (2) shows the estimates of the second-stage regression. These results confirm the positive association between IDV and the probability of default. It estimates the effect of IDV on the probability of default to be around 0.93, slightly higher than the OLS estimates and statistically significant at the 0.01% level. This result confirms our hypothesis that Individualism leads to more corporate risk-taking.

4.3. Alternative measures

We consider three additional robustness tests that focus on measurement. First, we examine whether the results are robust to different Probability of Default horizons. Second, we use an alternative measure of corporate risk altogether, known as the Actuarial Spread. Last, we consider alternative culture frameworks. In Table 5, we report the results for our robustness analysis. All regressions

Table 5
Robustness: alternative measures.

Panel A: Alternative Default Horizons						
	1 month	3 months	6 months	24 months	36 months	60 months
IDV	0.036***	0.121***	0.278***	1.57***	2.49***	4.20***
	(5.28)	(6.09)	(7.43)	(13.82)	(16.73)	(20.88)
Controls	YES	YES	YES	YES	YES	YES
Industry and Year FE	YES	YES	YES	YES	YES	YES
N	111,697	111,697	111,697	111,697	111,697	111,697
R^2	0.021	0.029	0.042	0.121	0.161	0.220
Panel B: Actuarial Spread						
IDV	0.525***					
	(9.28)					
Controls	YES					
Industry and Year FE	YES					
N	111,697					
R^2	0.038					

Panel C: Alternative Culture Measures			
	GLOBE (Inst. Collectivism)	GLOBE (In-Group Collectivism)	WVS (Income Equality)
IDV Measure	−24.27***	−17.01***	−121.86***
	(−9.09)	(−5.66)	(−6.11)
Controls	YES	YES	YES
Industry and Year FE	YES	YES	YES
N	102,116	102,116	69,707
R^2	0.069	0.068	0.061

Note: This table reports the regression results for various robustness tests. In Panel A, we report the results for different horizons the default risk is estimated over. In Panel B, we report the results, replacing the dependent variable (PD) with the Actuarial Spread (AS). In Panel C, we assess the robustness of our results to Hofstede's culture framework. We replace Hofstede's (2001) IDV measure with the "practices" scores for GLOBE Institutional collectivism and GLOBE In-Group Collectivism, and the WVS score on income equality (6th wave). All regressions include the same control variables as in Table 3, and we control for industry and year fixed effects. Standard errors are clustered at the firm level, and *** indicates significance at the 1% level.

include the controls, industry, and year fixed effects as in Column (2) of Table 3. We cluster standard errors at the firm level.

As shown from Panel A of Table 5, varying the default horizons that PD is estimated over has no impact on the observed relation. We observe a significant positive relation between IDV and the Probability of Default for all horizons, showing that our results are robust to alternative PD horizons. We further observe that the coefficient on IDV increases in these regressions, suggesting that IDV plays a more prominent role in PD at longer horizons.

In Panel B of Table 5, we consider the effect of the Actuarial Spread (AS). The AS measures a firm's credit risk based on the price (spread) from a CDS contract under the standard market CDS structure, with the physical probability of default (PD) as a key input for pricing instead of risk-neutral default probabilities.[7] AS is also used as a proxy for default risk in related literature (e.g., Dewenter & Riddick, 2018; Duan, 2014; Jang, Kim, & Lee, 2021; Pathan, Haq, Faff, & Seymour, 2021). Panel B shows that the results for AS are in line with our main results. The coefficient on IDV is positive and significant.

In Panel C of Table 5, we consider several alternative measures to Hofstede's (2001) individualism score. First, we consider the GLOBE (House et al., 2004) culture scores of collectivism (both institutional and in-group collectivism) and focus on the "practices" scores (practices scores reflect the practices as they are in a particular country). These collectivism scores would be inversely related to Individualism, so we expect a negative sign on these coefficients. Second, we consider another alternative metric based on the World Value Survey (WVS). From this survey, we focus on the question related to income inequality. Earlier studies indicate that there exists a strong negative relationship between Hofstede's (2001) IDV dimension and the level of income inequality in a country (Nikolaev, Boudreaux, and Salahodjaev (2017), so we also expect a negative sign on the coefficients here. We obtain data from the WVS's last (6th) wave. Panel C shows that our results are robust to the alternative culture measures. We see that the coefficients are negative as expected and highly significant.

5. Conclusion

In this paper, we document a strong relationship between the cultural dimension of Individualism and corporate risk-taking. While prior studies have focused on specific dimensions of corporate risk-taking, we focus on an omnibus measure of corporate risk-taking, namely the Probability of Default. As hypothesized, we document a positive relationship between Individualism and the Probability of Default, which aligns with the argument that individualistic cultures incentivize risk-taking and promote self-focus and

[7] For more detail, about the calculation of AS, see Duan (2014).

overconfidence. Our result holds after a battery of robustness tests.

Our paper contributes to the growing culture and finance literature. It demonstrates that it is not just the formal institutions that can explain cross-country differences in corporate decision-making but also soft/informal institutions that play an essential role.

Our results have managerial and theoretical implications. First, companies that operate in culturally distinct markets could encounter a vastly different attitude towards risk-taking among their managers than what is commonly accepted in their cultural context. These companies may want to keep this (lack of) risk-taking in check or adjust their strategy to the new cultural environment. Second, this study shows that risk attitude is not simply an inherent personal trait but is strongly influenced by the norms and values of a nation's culture. The better we understand the relationship between these informal institutions and actual financial decisions, the better these effects can be incorporated in predictive models.

Declaration of competing interest

We have no conflict of interest.

Appendix A. Variable description

Variable	Definition	Sour
AS	Actuarial Spread	CRI Database from NUS
Cash Flow/Tot. Assets	Cash and short-term investment scaled by total assets	Compustat Global
Credit Market/GDP	Domestic credit to private sectors as a percentage of GDP	World Bank Country Development Indicators
Creditor Rights Index	Creditor protection index of Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008)	Djankov et al. (2008)
Debt/Tot. Assets	Total liability scaled by total assets	Compustat Global
Dividends/Tot. Assets	Cash dividends scaled by total assets	Compustat Global
GDP Growth	GDP growth rate	World Bank Country Development Indicators
Individualism	Individualism scores of Hofstede et al. (2010)	https://geerthofstede.com/research-and-vsm/dimension-data-matrix/
Intangibles/Tot. Assets	Intangible asset scaled by total assets	Compustat Global
log(Asset)	The logarithm of total assets value denominated by UDS	Compustat Global
log(GDP)	The logarithm of constant 2010USD GDP per capita	World Bank Country Development Indicators
Masculinity	Masculinity scores of Hofstede et al. (2010)	https://geerthofstede.com/research-and-vsm/dimension-data-matrix/
PD	Probability of Default	CRI Database from NUS
Political Rights Index	Index of political rights of countries	Freedom House
Power Distance	Power distance scores of Hofstede et al. (2010)	https://geerthofstede.com/research-and-vsm/dimension-data-matrix/
Shareholder Rights Index	Revised anti-director rights index of Djankov et al. (2008)	Djankov et al. (2008)
Stock Market/GDP	Stock market capitalization to GDP ratio	World Bank Country Development Indicators
Tobin's Q	The market value of equity plus total assets minus book value total equity and deferred taxes, scaled by total assets	Compustat Global
Uncertainty Avoidance	Uncertainty avoidance scores of Hofstede et al. (2010)	https://geerthofstede.com/research-and-vsm/dimension-data-matrix/

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