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Universal Time Preference

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Abstract

Time preferences are central to human decision making; therefore, a thorough understanding of their international differences is highly relevant. Previous measurements, however, vary widely in their methodology, from questions answered on the Likert scale to lottery-type questions. We show that these different measurements correlate to a large degree and that they have a common factor that can predict a broad spectrum of variables: the countries' credit ratings, their innovation, gas prices (as a proxy for environmental protection), body mass index (as a proxy for health consciousness), and average years of school attendance. The resulting data on this time preference factor for N=117 countries and regions will be highly useful for further research. Our aggregation method is applicable to merge cross-cultural studies that measure the same latent construct with different methodologies.

1. Introduction

What is time? This is a fascinating question to almost every human being. Einstein reminded us that "the distinction between the past, present and future is only a stubbornly persistent illusion." In his book "Time Wars", Jeremy Rifkin noted that "Every culture has its own unique set of temporal fingerprints. To know a people is to know the time values they live by." Is there a way to measure this cultural variation of "temporal fingerprints"?

In this paper, we compare and integrate several important previous studies on cross-cultural differences in time orientation. The good news is that we find converging evidence of cultural variations of such "temporal fingerprints", and we illustrate the predictive power of our composite index on various behaviors at the country level, ranging from savings to environmental protection.

Scientists have developed many different methods to trace this "temporal fingerprint." For example, economists typically measure the discounting rate between current and future payoffs through field and experimental studies, either inferred from consumers' choices or elicited with stylized intertemporal prospects [1, 2]. Sociologists ask statements related to time orientation, e.g., the importance of thrift and tradition [3]. Social psychologists observe actual behavior in everyday situations, e.g., the average speediness of salespersons in standardized tasks [4]. A priori, it is not clear whether these methods measure one and the same concept – an important and unfortunately often overlooked issue [5] – although occasionally, relations between different methodologies have been found [6].

In this article, we collect information from several large-scale international studies on time orientations and time preferences that used very different methodologies. We show that there is one clear underlying factor that can be extracted via principal component analysis. Using an appropriate statistical method, we are able to estimate this factor for a large number of countries and regions (N=117). The factor is then shown to have high external validity: it is related to a number of variables that have previously been suggested to be influenced by time preferences.

Therefore, in the age of a replication crisis [7], our results provide good news for researchers in the field of culture and time: the previous studies reveal one common factor related to a nondomain-specific "time value" that can predict a variety of general country differences at the aggregate level. We also demonstrate a useful method for cross-cultural social scientists to test the convergence of interdisciplinary cross-national empirical studies at relatively low cost.

2. Results

2.1 Cross-study reliability

We use data on time orientation and time preferences from six systematic international comparison studies (Table 1). Although the methodology of these studies varies widely, we find high correlations between them (Table 2). A reliability analysis yields a Cronbach's alpha of 0.893 (0.792 when taking out the two studies with the lowest number of countries). Both results suggest that there is a common factor underlying country variations in time preferences.

Table 1. Overview of the international studies on time preferences. We used these six studies with ten measurements of time preference for our analysis. The methodology of these studies varies largely.

Study	Variable	Method
INTRA [6]	Patience	Binary payment choice (1 month)
	Delta	Certainty equivalence questions on payoffs in 1 year and 10 years
	Beta	
Falk et al. [8]	Patience	Certainty equivalence question and self-assessed patience (weighted av-
Breuer et al. [9]	Beta	Certainty equivalence questions on payoffs in 1 year and 10 years
	Delta	
Levine et al. [4]	Pace of life	Based on average walking speed, accuracy of clocks, postal service speed
World Value Survey [10]	Long-term orientation (LTO)	Likert-scale questions about the importance of thrift, tradition, etc.
GLOBE [11]	Future-orientation, societal practices (FOSP)	Likert-scale questions about time orientation in behavior
	Future-orientation, societal values (FOSV)	Likert-scale questions about time orientation in values

We estimate the common factor of time preferences using principal component analysis (PCA) for the set of all studies and (as robustness test) for a subset of the studies to avoid the overrepresentation of a single study. The factor loadings are shown in Table 3. Then, we use these factor loadings to estimate a universal preference variable for the set of all N=117 countries and regions in our data. (See the methodology section for details on the estimation procedure). We call the resulting factor "universal preferences for time" (short: UP time).

Since we carry out the first analysis with ten studies and the second with a subset of them, we have two resulting variants of the UP time variable. The resulting country-level data are shown in Table A in S1 File, together with weights that specify the reliability of each particular measurement (see the methods section for details).

The correlations of UP time with previous studies are high and statistically significant (with the exception of the data from [10], who measured only nine countries), see Table 4. Given that the variable is computed using the data from these studies, this is not too surprising. The degree of correlation of the standard UP time variable with the single study variables (in all cases exceed-

ing 0.6) and its significance (mostly p<0.001) is still noteworthy and again underlines the existence of a common factor in time preference measurements.

Table 2. Correlations of the ten time preference variables. For each pair of measurements, the Pearson correlation coefficient, the p-value and the number of countries for which both data sets provide cases are displayed.

		INTRA		Falk et al.	Breuer et al.		Levine et al.	WVS	GLOBE	
	Patience	Delta	Beta	Patience	Beta	Delta	Pace	LTO	FOSP	FOSV
Patience	1	.365**	.445**	.632**	0.657	.791*	-.472*	.290*	.461**	-.486**
		0.007	0.001	0	0.109	0.034	0.027	0.039	0.004	0.002
	53	53	53	40	7	7	22	51	38	38
Delta	.365**	1	.591**	.380*	-0.004	-0.072	-0.369	-0.052	0.263	-0.147
	0.007		0	0.016	0.994	0.877	0.091	0.719	0.111	0.377
	53	53	53	40	7	7	22	51	38	38
Beta	.445**	.591**	1	.535**	-0.114	-0.024	-0.344	-0.169	.379*	-0.115
	0.001	0		0	0.808	0.96	0.117	0.237	0.019	0.492
	53	53	53	40	7	7	22	51	38	38
Patience	.632**	.380*	.535**	1	-0.075	0.4	-.597**	.355**	.678**	-.540**
	0	0.016	0		0.86	0.326	0.003	0.005	0	0
	40	40	40	76	8	8	23	61	43	43
Beta	0.657	-0.004	-0.114	-0.075	1	.836**	-0.141	-0.027	.779*	-0.123
	0.109	0.994	0.808	0.86		0.005	0.822	0.944	0.013	0.753
	7	7	7	8	9	9	5	9	9	9
Delta	.791*	-0.072	-0.024	0.4	.836**	1	0.01	0.451	.756*	-0.411
	0.034	0.877	0.96	0.326	0.005		0.987	0.223	0.018	0.272
	7	7	7	8	9	9	5	9	9	9
Pace	-.472*	-0.369	-0.344	-.597**	-0.141	0.01	1	-0.346	-0.266	0.279
	0.027	0.091	0.117	0.003	0.822	0.987		0.077	0.199	0.177
	22	22	22	23	5	5	30	27	25	25
LTO	.290*	-0.052	-0.169	.355**	-0.027	0.451	-0.346	1	0.227	-.426**
	0.039	0.719	0.237	0.005	0.944	0.223	0.077		0.113	0.002
	51	51	51	61	9	9	27	95	50	50
FOSP	.461**	0.263	.379*	.678**	.779*	.756*	-0.266	0.227	1	-.266*
	0.004	0.111	0.019	0	0.013	0.018	0.199	0.113		0.044
	38	38	38	43	9	9	25	50	58	58
FOSV	-.486**	-0.147	-0.115	-.540**	-0.123	-0.411	0.279	-.426**	-.266*	1
	0.002	0.377	0.492	0	0.753	0.272	0.177	0.002	0.044	
	38	38	38	43	9	9	25	50	58	58

** Correlation is significant at the 1% level ,* significant at the 5% level.

Table 3. Weights of the principal component analysis (PCA). In the first model, all ten measurements were used; in the second model, only six were chosen to avoid overrepresenting studies with more than one measurement.

Study	Variable	Weights (PCA)	
INTRA	Patience	0.741	0.699
	Delta	0.488	
	Beta	0.554	
GPS	Patience	0.724	0.78
Breuer et al.	Beta	0.381	0.329
	Delta	0.449	
Levine et al.	Pace	0.46	0.554
WVS	LTO	0.322	0.442
GLOBE	FOSP	0.7	0.743
	FOSV	0.563	
Total variance explained		30.9%	37.7%

Table 4. Correlations of the UP time variables with previous measurements. Pearson correlations, p-values and number of common country data entries are displayed.

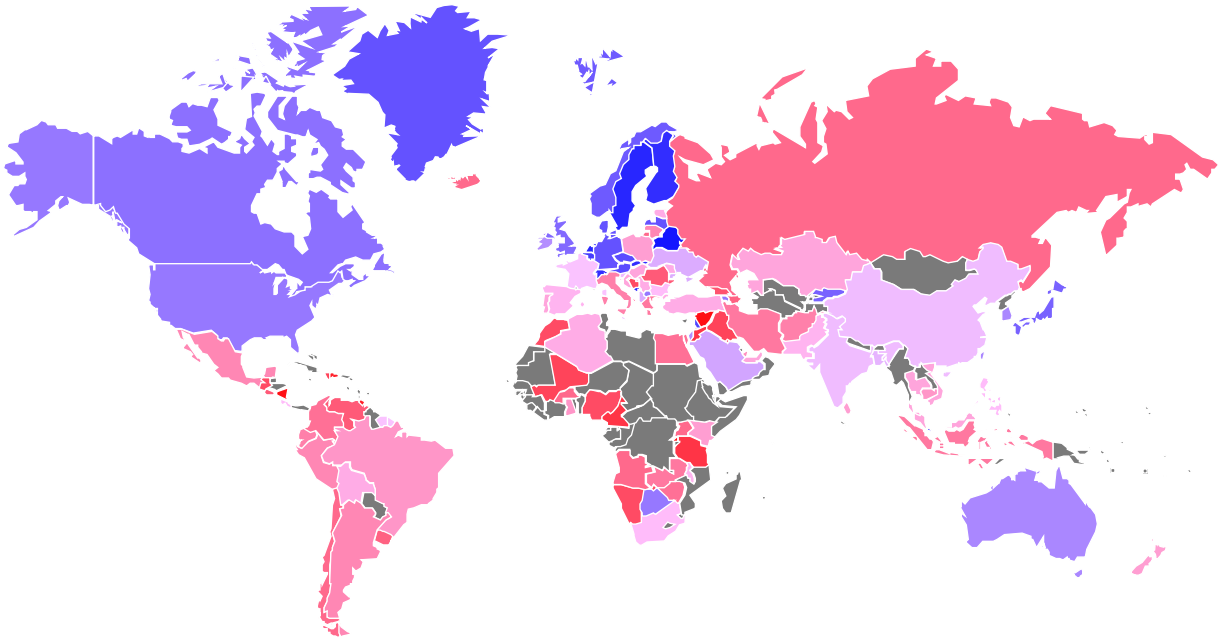
	UP Time 10	UP Time 6
Patience	.824**	.835**
(INTRA)	<0.001	<0.001
	53	53
Delta	.612**	.342*
(INTRA)	<0.001	0.012
	53	53
Beta	.690**	.448**
(INTRA)	<0.001	0.001
	53	53
Patience	.890**	.897**
(GPS)	<0.001	<0.001
	76	76
Beta	0.647	0.646
(Breuer et al.)	0.06	0.06
	9	9
Delta	.809**	.817**
(Breuer et al.)	0.008	0.007
	9	9
Pace	-.716**	-.740**
(Levine et al.)	<0.001	<0.001
	30	30
LTO	.602**	.685**
(WVS)	<0.001	<0.001
	95	95
FOSP	.742**	.809**
(Globe)	<0.001	<0.001
	58	58
FOSV	-.673**	-.543**
(Globe)	<0.001	<0.001
	58	58

**/* Correlation is significant at the 0.01/0.05 level (2-tailed).

Fig 1 provides a world map where the UP time variable (estimated from the full set of studies) is color coded. While there seem to be some outliers (usually associated with a very low weight, which is not shown in the map), a general pattern emerges, with the Anglo-American countries and Central and Northern Europe showing generally very high numbers (corresponding to ``pa-

tient" time discounting), Southern and Eastern Asian countries showing medium-high numbers, and South American, Southern European, and African countries showing low numbers. Countries in the Middle East and Eastern Europe have heterogeneous values. This already suggests that between-country variation is neither random nor simply determined by interest rates or, more generally, economic stability. Instead, cultural factors seem to play a role as well, in accordance with earlier results.

Fig 1. World map of time preferences. Countries with preferences for more immediate rewards are colored in red, countries that emphasize future rewards more are marked in blue, gray colors indicate missing data.



2.2 **External validity**

Estimating a large international dataset on time preferences is only meaningful if the data describe or predict actual real-life phenomena. To test this, we used variables from very different fields where some have been previously applied to test international measurements of time preferences [6, 8, 12 - 17]. Details of the estimation and data sources are provided in the methods section:

- Equity risk premium, i.e. the excess return of stocks over bonds,
- Value of education (proxied by the average years of school attendance),
- Overall development of the countries (proxied by the human development index),

- Innovation factor (measuring the ability of a country to develop technological innovations),
- Health consciousness (proxied by the average body mass index, relating body weight and height),
- Credit rating (estimating a country's risk to default),
- Environmental protection (proxied by the average price for gas since this price depends mostly on taxation that is motivated by environmental concerns),
- Resilience (calculated as an index, based on a number of factors).

In all of these cases, time preferences should play a predictive role (and in some of them, a reverse causality is likely as well): there is always a tradeoff between short-term costs (decreasing spending, working hard to make innovations, driving less, eating less, studying longer etc.) versus a long-term benefit (e.g., less debts, economic success through innovations, clean environment and less global warming, longer and healthier life, better job perspectives) [13, 14, 18 - 20].

Indeed, we find in most of these cases a strong relation of these variables to UP time, as the bubble plots (Fig 2) indicate (where the bubble sizes correspond to the respective country weights). The only exception is BMI, where no relation is visible. An explanation for this will be given below.

A correlation analysis is, of course, only the first step: there are also certain economic factors that influence all of these parameters: wealthier countries have it easier, e.g., to protect the environment or to improve education. There are also obvious interrelations between time preferences and wealth because causality might work in both ways here: more "patient" countries might become richer, but richer, more stable countries can more easily be "patient". Since this effect has already been demonstrated in previous work [6, 8], we need to control for country wealth (proxied by GDP per capita).

There are other economic reasons that might lead to steeper time discounting, in particular economic instability and high interest rates. We therefore also control for the volatility of the GDP growth (measured over the past 20 years), the interest rate and the credit spread of government bonds.

For each of the eight variables above, we therefore conduct a regression analysis, controlling for each of these four factors. To avoid collinearity issues, we usually control for one variable at a time. We use UP10 as explanatory variable, but identical regressions with UP6 lead basically to the same significance results (provided on request). As weighting factors, we use the aforementioned weights (see Table A S1 File). We also calculate the difference between the adjusted R^2 when including UP10 into the regression versus the same regression *without* UP10 to illustrate the additional explanatory power of time discounting.

Fig 2. Bubble plots of various variables and universal preferences for time (UP time, on the x-axis). In most cases, we can see a clear dependence. The sizes of the bubbles correspond to the weight of the country data. Weighted regression lines in red.

The results of the regressions are presented in Table 5. In the case of the body mass index (BMI), the relation to wealth is nonmonotone: people in very poor countries can simply not afford to become obese, while people in very rich countries have the means to pay more attention to health and therefore tend to have lower BMI as well. We therefore always use GDP per capita as well as (GDP per capita) in the regressions. UP time is also significant in the regression for BMI: this dependence was obfuscated in Fig 2d due to the nonlinear effect of GDP per capita on BMI, mentioned above. We see that in nearly all cases, the UP time variables have a significant and often substantial predictive power. Only the p-value in the case of the gas price is above 0.05 in one model, while the p-values for innovation, credit rating and resilience are below 0.1% for all models.

The predictive power is also substantial: using only UP time and GDP per capita, it is possible to explain approximately 50% of the variation in the education variable and more than 70% of the innovation factor, the credit rating and resilience.

These examples demonstrate that our time preference variable, UP time, has a high external validity across a broad range of applications. It also shows that this is not because the variable is simply a proxy for economic wealth, as we have controlled for this variable in the above regressions.

3. Discussion

We have seen that different measurements of time preferences on the country level have a unique underlying factor, a "temporal fingerprint", as we mentioned at the beginning of this article. This resonates with John Rae's conjecture that countries differ in their "effective desire of accumulation," a sociological and psychological factor, which in turn influences the production activity and national wealth [21]. Combining those previous measurements, this factor can be estimated for a large number of countries. The factor has good external validity and can predict various variables connected to time preferences, making it highly useful as a foundation for future studies in this field. A strong advantage of the new dataset is that it contains a large number of countries, which allows us to control for more country-level variables than was previously possible.

Our approach certainly hinges on high-quality data from which we can build up our dataset. While we have seen that all datasets reflect a common concept of time preferences, some are obviously better than others in capturing this concept. We consider these differences by using different weights for each study (obtained from a principal component analysis). There are also a number of countries for which the coverage in previous studies is low or that have not yet been covered at all. This leads to missing data points and a few outliers. Hence, there is a need for further international studies on time discounting to be included in our dataset.

For the abovementioned reasons, it would not be appropriate to derive a "country ranking" of time preferences from our data since countries covered in only one study will tend to have more extreme evaluations. We recommend instead using the data only as a basis for statistical analysis. If possible, data should be weighted by our weighting parameters. Since the UP10 and UP6 data

do not show large differences regarding their external validity, we recommend using the UP10 data since it is derived from a larger set of measurements.

Table 5. Regression analysis for external validity. Weighted regressions of the eight variables (equity risk premium, schooling, HDI, innovation, credit rating, innovation, health consciousness, environmental protection and resilience) on UP10 with various control variables.

*Additional control variable $(GDP/cap)^2$, since dependence on GDP/cap non-monotone.

Equity risk premium	Model 1	Model 2	Model 3	Model 4
UP10	-0.35*	-0.48***	-0.26***	-0.19**
	(-2.62)	(-5.07)	(-4.26)	(-2.92)
GDP/cap	-0.31*			
	(-2.34)			
Vola GDP growth		0.32***		
		-3.39		
Interest rate			0.75***	
			-12.14	
Credit spread				0.79***
gov. bonds				-11.94
N	70	72	71	57
adj. R2	0.36	0.40	0.78	0.81
additional R2	0.05	0.21	0.05	0.03

Schooling	Model 1	Model 2	Model 3	Model 4
UP10	0.28**	0.65***	0.55***	0.51***
	-2.91	-8.36	-6.61	-4.77
GDP/cap	0.47***			
	-4.83			
Vola GDP growth		0.14(*)		
		-1.79		
Interest rate			-0.14	
			(-1.66)	
Credit spread				-0.21(*)
gov. bonds				(-1.91)
N	108	111	107	68
adj. R2	0.48	0.38	0.38	0.39
additional R2	0.04	0.39	0.25	0.20

HDI	Model 1	Model 2	Model 3	Model 4
UP10	0.24**	0.67***	0.55***	0.5***
	-2.84	-8.96	-7.2	-5.16
GDP/cap	0.6***			
	-7.12			
Vola GDP growth		0.05		
		-0.66		
Interest rate			-0.25***	
			(-3.28)	
Credit spread				-0.33***
gov. bonds				(-3.40)
N	108	111	107	68
adj. R2	0.61	0.42	0.48	0.50
additional R2	0.03	0.41	0.25	0.19

Innovation	Model 1	Model 2	Model 3	Model 4
UP10	0.48***	0.77***	0.73***	0.7***
	-6.9	-12.79	-11.54	-8.95
GDP/cap	0.46***			
	-6.63			
Vola GDP growth		-0.11(*)		
		(-1.86)		
Interest rate			-0.18**	
			(-2.80)	
Credit spread				-0.22**
gov. bonds				(-2.79)
N	101	104	101	69
adj. R2	0.75	0.65	0.66	0.67
additional R2	0.12	0.55	0.44	0.38

BMI	Model 1	Model 2	Model 3	Model 4
UP10	-0.46***	-0.38**	-0.44***	-0.45*
	(-3.48)	(-2.93)	(-3.33)	(-2.59)
GDP/cap	1.27***	1.27***	1.34***	1.29***
	-4.27	-4.4	-4.3	-3.33
GDP/cap^2	-0.81**	-0.83***	-0.85**	-0.82*
	(-3.11)	(-3.27)	(-3.18)	(-2.44)
Vola GDP growth		0.22*		
		-2.45		
Interest rate			0.09	
			-0.84	
Credit spread				0.04
gov. bonds				-0.28
N	107	107	105	67
adj. R2	0.15	0.19	0.15	0.12
additional R2	0.09	0.06	0.08	0.08

Credit rating	Model 1	Model 2	Model 3	Model 4
UP10	0.32***	0.68***	0.55***	0.5***
	-4.13	-9.89	-8.72	-6.46
GDP/cap	0.58***			
	-7.61			
Vola GDP growth		-0.13(*)		
		(-1.91)		
Interest rate			-0.4***	
			(-6.34)	
Credit spread				-0.47***
gov. bonds				(-6.00)
N	105	107	105	69
adj. R2	0.69	0.53	0.65	0.68
additional R2	0.05	0.43	0.25	0.19

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Appendix

Table S1. List of the time preference country data in our study. The time preference variables are denoted by UP (10) for the universal preferences of time based on all ten measurements and UP (6) for that based only on the selection of six measurements. The columns labeled “weights” signify the reliability of each data entry and should be used in regression analysis as weights.

Country/region	UP10	weights	UP6	weights	Country/region	UP10	weights	UP6	weights
Afghanistan	-0.54	0.13	-0.54	0.22	El Salvador	-0.84	0.38	-0.83	0.49
Africa East	-0.54	0.06	-0.54	0.12	Estonia	-0.13	0.53	0.68	0.54
Africa West	-1.5	0.06	-1.5	0.12	Finland	1.27	0.76	1.02	0.75
Albania	0.21	0.29	0.31	0.33	France	0.06	0.85	0.29	0.91
Algeria	-0.13	0.19	-0.18	0.34	Georgia	-0.92	0.76	-1.21	0.75
Angola	-0.74	0.33	-0.58	0.2	Germany	0.99	1	1.33	1
Arab countries	-0.92	0.06	-0.92	0.12	Ghana	-0.37	0.19	-0.47	0.34
Argentina	-0.47	0.76	-0.79	0.75	Greece	-0.62	0.85	-0.69	0.91
Armenia	0.66	0.06	0.66	0.12	Guatemala	-0.94	0.37	-0.97	0.43
Australia	0.52	0.76	0.35	0.75	Haiti	-1.01	0.13	-1.01	0.22
Austria	1.02	0.85	1.22	0.91	Hong Kong	0.32	0.71	0.65	0.69
Azerbaijan	-0.76	0.39	-0.28	0.32	Hungary	-0.19	0.85	-0.36	0.91
Bangladesh	0.18	0.19	0.18	0.34	Iceland	-0.71	0.06	-0.71	0.12
Belarus	1.48	0.06	1.48	0.12	India	0.11	0.91	0.17	0.84
Belgium	1.15	0.39	1.4	0.32	Indonesia	-0.57	0.51	-0.58	0.71
Bolivia	-0.17	0.37	-0.11	0.43	Iran	-0.59	0.58	-0.62	0.65
Bosnia	-0.98	0.53	-0.51	0.54	Iraq	-1.03	0.19	-1.02	0.34
Botswana	0.64	0.13	0.64	0.22	Ireland	0.45	0.71	0.35	0.69
Brazil	-0.33	0.43	-0.29	0.55	Israel	0.46	0.76	0.55	0.75
Bulgaria	-0.06	0.15	0	0.28	Italy	-0.55	1	-0.31	1
Burkina Faso	-0.73	0.06	-0.73	0.12	Japan	0.82	0.85	0.9	0.91
Cambodia	-0.32	0.13	-0.32	0.22	Jordan	-1.16	0.28	-1.16	0.5
Cameroon	-1.15	0.13	-1.15	0.22	Kazakhstan	-0.21	0.37	-0.61	0.43
Canada	0.75	0.85	0.93	0.91	Kenya	-0.28	0.22	-0.29	0.38
Chile	-0.73	0.53	-0.83	0.54	Kuwait	-0.91	0.23	-1.21	0.21
China	0.12	1	0.25	1	Kyrgyzstan	0.86	0.06	0.86	0.12
Colombia	-0.66	0.76	-0.84	0.75	Latvia	0.98	0.06	0.98	0.12
Costa Rica	-0.06	0.45	-0.2	0.59	Lebanon	1.11	0.33	0.45	0.2
Croatia	-0.24	0.53	-0.07	0.54	Lithuania	-0.44	0.53	0.22	0.54
Czech Rep	1.03	0.85	0.47	0.91	Luxembourg	0.38	0.39	0.01	0.32
Denmark	0.98	0.63	0.86	0.53	Macedonia Rep	0.69	0.06	0.69	0.12
Dominican Rep	-1.33	0.06	-1.33	0.12	Malawi	-0.11	0.13	-0.11	0.22
Ecuador	-0.51	0.23	-0.17	0.21	Malaysia	-0.19	0.63	0.59	0.53
Egypt	-0.67	0.43	-0.72	0.55	Mali	-1.04	0.06	-1.04	0.12

Country/region	UP10	weights	UP6	weights	Country/region	UP10	weights	UP6	weights
Malta	0.08	0.06	0.08	0.12	Slovenia	0.07	0.63	0	0.53
Mexico	-0.49	0.85	-0.56	0.91	South Africa	-0.03	0.19	-0.06	0.34
Moldova	-0.17	0.53	0.27	0.54	South Korea	0.52	1	0.67	1
Montenegro	1.25	0.06	1.25	0.12	Spain	-0.07	0.91	-0.32	0.84
Morocco	-0.99	0.43	-1.08	0.55	Sri Lanka	-0.26	0.13	-0.26	0.22
Namibia	-0.95	0.23	-0.7	0.21	Suriname	0.03	0.13	0.03	0.22
Netherlands	1.35	0.85	1.53	0.91	Sweden	1.36	0.85	1.44	0.91
New Zealand	-0.27	0.63	-0.79	0.53	Switzerland	1.27	0.85	1.62	0.91
Nicaragua	-1.65	0.13	-1.65	0.22	Syria	-1.56	0.09	-1.56	0.16
Nigeria	-0.97	0.76	-1.01	0.75	Taiwan	0.52	0.71	0.61	0.69
Norway	0.91	0.39	0.57	0.32	Tanzania	-1.16	0.53	-1.26	0.54
Pakistan	-0.09	0.19	-0.07	0.34	Thailand	-0.24	0.76	-0.6	0.75
Peru	-0.45	0.19	-0.48	0.34	Trinidad and Tobago	-1.35	0.06	-1.35	0.12
Philippines	-0.01	0.43	0.23	0.55	Turkey	-0.14	0.76	-0.06	0.75
Poland	-0.27	0.85	-0.07	0.91	Uganda	-0.75	0.19	-0.76	0.34
Portugal	-0.2	0.76	-0.46	0.75	UK	0.79	0.85	0.87	0.91
Puerto Rico	-1.87	0.06	-1.87	0.12	Ukraine	0.19	0.19	0.31	0.34
Qatar	-0.43	0.23	-0.08	0.21	United Arab Emirates	-0.24	0.13	-0.24	0.22
Romania	-0.82	0.61	-0.54	0.7	Uruguay	-0.79	0.06	-0.79	0.12
Russia	-0.74	0.91	-0.67	0.84	USA	0.64	0.85	0.67	0.91
Rwanda	-1.47	0.19	-1.44	0.34	Venezuela	-0.82	0.43	-0.9	0.55
Saudi Arabia	0.26	0.19	0.21	0.34	Vietnam	-0.23	0.53	0.02	0.54
Serbia	-0.16	0.19	-0.13	0.34	Zambia	-0.62	0.29	-0.5	0.33
Singapore	1.22	0.53	1.55	0.58	Zimbabwe	-0.68	0.43	-0.56	0.55
Slovakia	1.3	0.06	1.3	0.12					

Table S2. List of variables and their respective sources

Variable	Source
Equity risk premium	Excess return of stocks over bonds, as estimated by Fernandez et al. (2020), see also Fernandez et al. (2015).
Average years in school	Expected years of schooling is a component of the Education index from the Human Development Report 2016, available at: http://hdr.undp.org/en/data#
Human Development Index	United Nations Development Programme http://hdr.undp.org/en/data#, 2018 data
Innovation factor	Global Competitive Report 2008–2009 (Porter & Schwab, 2008, p. 18). It measures the technological innovation of a country, in particular investment in research and development (R&D) in private sectors, the presence of high-quality scientific research institutions, collaboration in research between universities and industry, and the protection of intellectual property.
Body Mass Index	Measure of relative body weight, based on an individual's mass and height, based on WHO data, available at https://www.who.int/data/gho/data/indicators/indicator-details/GHO/mean-bmi-(kg-m-)-(age-standardized-estimate)
Credit rating	Average long-term foreign currency credit rating for sovereign bonds as reported by Standard & Poor's, Fitch and Moodys, available at https://www.theglobaleconomy.com/rankings/credit_rating/
Gasoline price	Esty et al. (2005), measured by the ratio of the gasoline price to the world average.
Resilience index	A measurement of enterprise resilience to disruptive events, calculated by FM Global (2019).
GDP/capita	Gross domestic product as taken from World Bank
Interest Rate	Central bank announcements, as collected by https://tradingeconomics.com/country-list/interest-rate
Credit spreads on government bonds	Spreads are measured with respect to the US, source: http://www.worldgovernmentbonds.com/spread-historical-data/

Table S3. Weights of the principal component analysis (PCA). In the first model, all ten measurements were used; in the second model, only six were chosen to avoid overrepresenting studies with more than one measurement.

Study	Variable	Weights (PCA)	
INTRA	Patience	0.741	0.699
	Delta	0.488	
	Beta	0.554	
GPS	Patience	0.724	0.78
Breuer et al.	Beta	0.381	0.329
	Delta	0.449	
Levine et al.	Pace	0.46	0.554
WVS	LTO	0.322	0.442
GLOBE	FOSP	0.7	0.743
	FOSV	0.563	
Total variance explained		30.9%	37.7%