



# A framework to update Hofstede's cultural value indices: economic dynamics and institutional stability

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**Abstract**

This study offers an update of the Hofstede cultural value dimensions. We argue that changes in economic conditions are the source of cultural dynamics, while the endurance of institutional characteristics provides the foundation for cultural stability. It is found that national wealth, measured by GDP per capita, has a curvilinear relationship with individualism, long-term orientation, and power distance scores. Relatively speaking, uncertainty avoidance and masculinity mainly reflect some rather stable institutional traditions, such as language, religion, climate, ethnic homogeneity, and legal origin, and are less likely to change over time.

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## INTRODUCTION

Hofstede's (1980, 2001) five cultural dimensions – power distance, individualism, uncertainty avoidance, masculinity, and long-term orientation – have arguably had far greater impact than other competing cultural dimensions (e.g., Kluckhohn & Strodtbeck, 1961; Schwartz, 1994; Smith, Peterson, & Schwartz, 2002; Trompenaars, 1993). According to Kirkman, Lowe, and Gibson (2006: 286), Hofstede's framework stands out in cross-cultural research because of its 'clarity, parsimony, and resonance with managers'. However, despite the framework's long-standing popularity, several studies have questioned the applicability of Hofstede's cultural value scores (McSweeney, 2002; Schwartz, 1994; Shenkar, 2001; Smith, 2002). One major criticism is that the indices fail to capture the change of culture over time (Kirkman et al., 2006). Although institutional factors such as language, religion, and geography are important elements in defining national culture (Ronen & Shenkar, 1985), anecdotal data provide significant evidence regarding the dynamics of cultures in an increasingly integrated world. For instance, Heuer, Cummings, and Hutabaratt (1999) find that the cultural difference between US and Indonesian managers in terms of individualism and power distance has declined over time. Ralston, Egri, Stewart, Terpstra, and Yu (1999) find that rapid economic development in China since the 1970s has led to

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significant generational shifts in work values: the new generation of Chinese managers is more individualistic and embraces less Confucian value than the old generation of Chinese managers does.

However, we have to note that the linkage between culture and the wealth of a nation or gross national product (GNP) per capita by itself, as recognized by Hofstede (1980, 2001), does not warrant the need to update Hofstede's cultural scores. Hofstede's cultural dimensions measure relative, not absolute, cultural values. Updating Hofstede's framework therefore becomes necessary when countries diverge in economic development, and hence the relative ranking of nations' cultural values changes over time. Table 1 provides the average GDP per capita in constant 2000 US dollars from 1970 to 1974 and from 1990 to 1994 for 48 countries with Hofstede's cultural scores. In this study, we substitute gross domestic product (GDP) per capita for GNP per capita because the quality of GDP data is, in general, better than that of GNP data. As Table 1 shows, the change of national wealth varies substantially across nations. Although countries such as Argentina, Iran, and Peru experienced a decline in both real income and relative rankings, most countries' GDP per capita increased significantly, with Hong Kong, Singapore, and South Korea leapfrogging over others from the 1970s to the 1990s. If national cultural values do in fact correlate with national wealth, it is reasonable to speculate that at least some of Hofstede's cultural dimensions have changed over time in absolute as well as relative terms.

Many studies have, indeed, sustained and amplified Hofstede's work in the past two decades (see Smith, Bond, & Kagitcibasi, 2006, for a review). The recently published GLOBE study edited by House, Hanges, Javidan, Dorfman, and Gupta (2004), *Culture, Leadership, and Organizations*, provides the closest replication of the Hofstede framework (Peterson, 2004). However, there are still unbridgeable conceptual and methodological differences between the two studies (Hofstede, 2006). For example, the GLOBE study uses two sets of indicators for national culture: *values based*, which are the values respondents personally hold; and *practices based*, which are the values respondents see being expressed in their society. The study finds a negative relationship between these two sets of cultural scores except for in-group collectivism and gender egalitarianism. According to Javidan, House, Dorfman, Hanges, and Sully de Luque (2006), this finding challenges the primary assump-

tion of the Hofstede framework that cultural values and practices should be positively related. However, it may also indicate that the GLOBE definition of values (i.e., what *should be* the values in an organization or society) is different from how values have typically been measured in cross-cultural research (Earley, 2006; Smith, 2006). Also, Hofstede's study involves only one organization (IBM) and one industry, whereas the GLOBE study includes multiple organizations in three different industries (financial services, food processing, and telecommunications). Although all surveys are conducted at the individual level, the two studies depart significantly in terms of how the individual scales are analyzed and aggregated to the societal level (Hanges & Dickson, 2006; Peterson & Castro, 2006). This difference has triggered a heated debate regarding the theoretical and empirical implications of multilevel studies (Dansereau & Yammarino, 2006; Dickson, Resick, & Hanges, 2006).

In sum, the GLOBE cultural scores not only differ in complex ways from Hofstede's cultural scores but also have their own limitations. Given the value of the Hofstede framework, it makes sense to continue using Hofstede's cultural dimensions as long as we can find a way to adjust them for changes over time. In addition, a model that can update cultural scores by using economic indicators is not just relevant to Hofstede's framework. As time passes, it will be useful for the GLOBE and other projects as well. It is unrealistic to replicate or redo any of the existing projects every 10 years. A statistical model that provides adjustments may have limitations, but it has the potential to be better than using the original scores alone.

The primary purpose of this study is to provide a formal framework to update Hofstede's indices based on the changing economic environments within countries. Specifically, we posit that societal cultural values should reflect both the institutional tradition and the economic conditions of a country. In particular, since societal characteristics such as language, religion, climate, ethnic homogeneity, and legal origin change very little over time, and they are not relevant to cultural updates, we use them as control variables in our model.

The second contribution of the paper is that we propose a curvilinear relationship between GDP per capita and Hofstede's cultural dimensions except for masculinity. Our empirical findings suggest that individualism, power distance, and long-term orientation are more prone to economic dynamics than uncertainty avoidance and masculinity. In

**Table 1** GDP per capita (constant 2000 US\$) in the 1970s and 1990s

Country	Average GDP per capita 1970–1974	Ranking in the 1970s	Average GDP per capita 1990–1994	Ranking in the 1990s	Change in ranking
Argentina	6902	21	6766	26	-5
Australia	12,362	13	16,478	16	-3
Austria	12,348	14	20,133	9	5
Belgium	12,281	15	18,844	14	1
Brazil	2200	34	3141	33	1
Canada	13,756	8	18,912	13	-5
Chile	2240	33	3534	30	3
Colombia	1293	41	1926	38	3
Costa Rica	2757	32	3346	31	1
Denmark	18,900	4	24,884	5	-1
Ecuador	1025	43	1321	43	0
El Salvador	2010	37	1765	39	-2
Finland	12,220	16	18,381	15	1
France	13,055	11	19,339	11	0
Germany	12,979	12	20,248	8	4
Great Britain	13,707	9	19,787	10	-1
Greece	6861	23	8813	23	0
Guatemala	1394	40	1515	42	-2
Hong Kong	6863	22	20,528	7	15
India	203	48	327	48	0
Indonesia	238	47	631	46	1
Iran	1785	38	1316	44	-6
Ireland	7540	19	14,108	21	-2
Israel	10,461	17	15,230	20	-3
Italy	10,147	18	16,393	17	1
Jamaica	3520	29	3120	34	-5
Japan	18,908	3	34,258	1	2
Malaysia	1235	42	2856	36	6
Mexico	3789	28	5146	29	-1
Netherlands	13,597	10	19,019	12	-2
New Zealand	13,877	7	15,261	19	-12
Norway	16,536	6	30,642	3	3
Pakistan	277	46	484	47	-1
Panama	2947	31	3301	32	-1
Peru	2139	36	1700	40	-4
Philippines	778	44	893	45	-1
Portugal	4913	26	8422	24	2
Singapore	5369	25	16,000	18	7
South Africa	3171	30	2906	35	-5
South Korea	2139	35	7550	25	10
Spain	7460	20	11,364	22	-2
Sweden	16,807	5	22,345	6	-1
Switzerland	26,826	1	32,145	2	-1
Thailand	566	45	1642	41	4
Turkey	1702	39	2558	37	2
Uruguay	3931	27	5232	28	-1
USA	19,282	2	28,552	4	-2
Venezuela	6432	24	5348	27	-3

Data source: World Development Indicators database.

particular, the change of individualism, power distance, and long-term orientation is nonlinear, and therefore complicates the absolute and relative

rankings of national cultural values over time. Overall, our updated Hofstede's cultural scores based on GDP per capita in the 1990s have stronger

correlations with GLOBE's value-based cultural scores than the original Hofstede indices do. This finding confirms the importance of adjusting the cultural dimensions with economic changes over time.

This study is organized as follows. In the next section, we provide the literature review and theoretical framework, followed by sections on the methods of empirical analysis and validation. The final section offers discussion and concluding remarks.

## LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Inglehart and Baker (2000) are among the first to study the impact of both economic and institutional factors on cultural changes. Using data that covered three waves of World Values Surveys for 65 societies in 1981–1982, 1990–1991, and 1995–1998, they find evidence of both massive cultural changes and the persistence of distinctive cultural traditions. They point out that economic development – especially as represented by growth in income – has systematic and predictable cultural consequences. In addition, countries with different cultural heritage in religion, language, and geographic location demonstrate diverse trajectories in cultural changes, even when they are subject to the same forces of economic development. In the following discussion, we first review the literature that relates institutional characteristics to cultural stability and then develop our hypotheses for the curvilinear relationship between national wealth and cultural dynamics.

### Institutional Factors and Cultural Stability

Because of the multidisciplinary nature of the subject, we focus on the existing research that relates to the determinants of Hofstede's dimensions. We first went through the work by Hofstede (1980, 2001) to identify the institutional factors that are considered relevant to each cultural dimension. Then we developed a common set of such variables by systematically reviewing additional literature (see Table 2 for a complete list). Finally, we searched for existing databases to identify appropriate measures for each variable and omit those, such as educational system, for which suitable measures could not be found. In addition, we deleted those variables that tend to change over time and have a correlation coefficient with GDP per capita greater than 0.6 (in absolute value). The final set of institutional variables we have includes religion, language, ethnic heteroge-

neity, climate, legal system, and female labor participation rate. To establish a formal relationship between cultural values and national wealth, we use the institutional characteristics as control variables in our empirical model, because the selected institutional variables, in general, do not change with economic conditions, and they mainly represent the conditions into which people are born.

### National Wealth and Cultural Dynamics

The relationship between cultural values and economic development can be dated back to classical Marxism, which posits that economic factors, such as production and control of resources, dictate all human activities, and hence are the foundation of all other changes in human societies. Conversely, Weber (1958) emphasized the impact of culture on economic systems – especially the rise of the Protestant work ethic and the emergence of capitalism. Although we do not subscribe to either economic or cultural determinism, we believe that economic and cultural variables are mutually supportive, and thus the characteristics of one can be used to make inferences about the other.

In fact, Inglehart (1990, 1997) and Inglehart and Oyserman (2004) offer two hypotheses relating changes in values to changes in economic conditions: scarcity and socialization. The scarcity assumption suggests that people tend to place the greatest value on the object that is in short supply. The socialization hypothesis suggests that cultural changes can occur only through intergenerational replacement, because it takes time to change the values developed in preadult years. Furthermore, Inglehart and Abramson (1994) find that materialism, which emphasizes economic and physical security, tends to dominate in countries that are economically disadvantaged, whereas postmaterialism, which places greater value on nonmaterial needs such as freedom, self-expression, and quality of life, dominates in developed countries. As a result of postwar economic development, values have shifted from materialism to postmaterialism in major developed countries from the 1970s to the 1990s. Similarly, Leung (2006), pointing to the link between economic development and postmaterialism in his analysis of East Asia, proposes that East Asians will come to emphasize those postmaterialist values as they experience higher levels of economic development. Finally, Hofstede (1980, 2001) shows that GNP per capita, geographic

**Table 2** Summary of the institutional determinants of Hofstede's cultural indices

<i>Institutional variables</i>	<i>Literature</i>	<i>Relations to Hofstede's indices</i>
1. Religion	Weber (1958), Hofstede (2001), Ronen and Shenkar (1985), Gomez-Mejia and Palich (1997), Carl, Gupta, and Javidan (2004), Emrich, Denmark, and Hartog (2004), Sully de Luque and Javidan (2004)	Roman Catholicism, Islam, and Hinduism tend to have high power distance whereas Protestantism prefers low power distance. Catholicism has high uncertainty avoidance whereas Protestantism, Buddhism and Islam have low uncertainty avoidance. Catholic traditions are more masculine than Protestant traditions. Religion can affect individualism through the belief of individual relationship with God.
2. Language	Ronen and Shenkar (1985), Gomez-Mejia and Palich (1997), Kashima and Kashima (1998)	Language is an important element to define cultural clusters. In particular, countries that use pronoun drop languages (Arabic, Spanish, and most Asian languages) have lower individualism and higher power distance scores. The languages with more than two second-person singular pronouns (Arabic, German, and Spanish) have higher uncertainty avoidance scores.
3. Climate	Hofstede (2001), Ronen and Shenkar (1985), Den Hartog (2004), Emrich et al. (2004), Carl et al. (2004)	Warm climate favors masculine culture and high power distance.
4. Ethnic heterogeneity	Triandis (1989), Lenartowicz, Johnson, and White (2003)	Ethnic diversity matters for cultural dimensions. Collectivism is associated with homogeneous cultures. Countries with more immigrants have lower power distance.
5. Legal system	Hofstede (2001), Sully de Luque and Javidan (2004)	High uncertainty avoidance is associated with many and precise laws and regulations in a country.
6. Female labor participation	Hofstede (2001)	Masculinity reflects gender difference in work-related values.
7. Confucianism	Hofstede and Bond (1984, 1988)	The philosophy of Confucius has significant impact on the long-term orientation of East Asian countries

latitude, population growth, and organization size are significantly correlated with power distance and individualism. Given that wealthy countries are located mainly in the North, and that they tend to have larger corporations, national wealth is again confirmed as a very important determinant of cultural values.

In this study we argue not only that culture is correlated with national wealth but also that it is correlated in a curvilinear manner owing to the dynamics of income inequality (Kuznets, 1955), ecological pattern (Berry, 1994), and saving (Read,

1993) throughout the course of economic development. In the following discussion, we provide arguments for the curvilinear relationship between national wealth and each of Hofstede's cultural dimensions.

The curvilinear relationship between national wealth and power distance – Hofstede's first cultural dimension – can be explained through the dynamics of income inequality during the process of economic development. Hofstede (2001) suggests that the existence of a middle class, which forms a bridge between the powerful and

the powerless (Adelman & Morris, 1967), is the force that lowers power distance. In other words, the higher the degree of income inequality is, the smaller the group of middle class and, hence, the higher the power distance scores. Subsequently, we must ask how income inequality is related to national wealth. In economics, this relation can be explained by the Kuznets effect (Kuznets, 1955), which describes an inverted-U pattern between income inequality and economic development. The theory suggests that inequality first increases and then decreases with the level of development. The cumulative effect of saving in the upper-income bracket and the process of urbanization that increases the income gap between the urban and rural population cause an increase in income inequality at the early stage of economic development. Income inequality declines with further economic development because of legislative interference such as tax policy, government-permitted or -induced inflation (which reduces the economic value of savings), entrepreneurial activities, and technological changes. If income inequality does explain the curvilinear relationship between power distance and national wealth, then a similar Kuznets quadratic relation should follow. That is, we expect national wealth to be positively related to power distance until a critical mass of the middle class is formed, or a threshold of average income is reached, leading to our first hypothesis:

**Hypothesis 1:** Power distance first increases and then decreases with (log) GDP per capita.

The relationship between national wealth and individualism – Hofstede's second cultural dimension – can be explained through ecological factors. Berry (1994) emphasizes the curvilinear relationship between cultural variations and subsistence patterns. When the subsistence patterns shift from gathering/hunting to agriculture and then from agriculture to manufacturing, the level of social conformity (i.e., the obligation to conform to social norms) will first increase and then decrease. However, most countries in Hofstede's sample had passed the gathering/hunting stage by the 1970s, and thus we extend the theory for cultural evolution from the agriculture-oriented economy to the manufacturing- and service-oriented economy.

Inglehart (1997) suggests that the process of industrialization is accompanied by the shift from traditional (usually religious) authority to rational

(or state) authority. The need to grow in size for competition and the need to acquire modern technology and weapons pave the way for the rise of impersonal and goal-oriented achievement standards. Consequently, the direction of social evolution during the modernization phase moves from individual needs to rational organizations that have superhuman power. However, as a country's income continues to rise, and progresses further into the services industry, the requirement of social conformity declines. Consequently, the post-modernization values that place more emphasis on individual freedom and self-expression emerge. Similarly, Triandis (1989) suggests that individualism is higher in professional jobs because one has to be more creative than in standardized operations in manufacturing jobs. In sum, we anticipate a U-shaped relationship between individualism and national wealth, leading to our second hypothesis:

**Hypothesis 2:** Individualism first declines and then increases with (log) GDP per capita.

The relationship between uncertainty avoidance and economic development can be likewise explained through the ecological factors. In Hofstede (1980) uncertainty avoidance has three components: rule orientation, employment stability, and stress. Concerns over employment stability and stress at work normally accompany the transition from an agricultural to an industrial economy. As people leave their lands for factories, and earn a living at the impulse of their employers, the demand for rules and physical and social security is likely to increase to satisfy survival needs. Using the World Value Survey, Inglehart (1997) finds that materialist values – which place top priority on rule orientation, stable economy, fighting inflation, building strong national defenses, and so on – dominated developed countries in the 1970s. However, as national wealth continues to rise and social structure becomes more sophisticated, the security concern declines. The postmaterialist values that dominated developed countries in the 1990s deemphasize both legal and religious authority, demand more say in government and job, and stress that ideas count more than money. In addition, Inkeles (1993) finds that both the objective and subjective indicators of the quality of life have improved with industrialization and modernization, and the majority of the population in developed countries worries less and feels happier



than people in developing countries. Thus we propose the following relationship between uncertainty avoidance and national wealth:

**Hypothesis 3:** Uncertainty avoidance first increases and then decreases with (log) GDP per capita.

For his fourth cultural dimension, Hofstede (2001) finds no correlation between the masculinity index and GNP per capita, GNP per capita growth rate, geographic latitude of a country, or the size of organizations. Similarly, Den Hartog (2004) reports no significant correlations between the assertiveness index – one of the two measures of the masculinity dimension in the GLOBE project – and economic variables.

In this study, we reexamine the relationship between the masculinity measure and national wealth by focusing on the social/ego aspects of Hofstede's masculinity dimension. The social factor includes a good relationship with managers and co-workers and living in a desirable area, and the ego factor places higher value on advancement opportunities, earnings, and recognition at work. In other words, the social/ego aspect of the masculinity index is to a large extent consistent with Inglehart's (1997) materialist and postmaterialist cultural definition. Although we are unable to support a curvilinear relationship in this case, we expect a negative correlation between the masculinity index and GDP per capita, leading to our fourth hypothesis:

**Hypothesis 4:** A country's masculinity is negatively related with its (log) GDP per capita.

The fifth dimension of Hofstede's framework, long-term orientation (LTO), was originally designed to reflect the difference between Eastern and Western values. It is also called *Confucian work dynamism* because of its connection to Confucian philosophy. However, some non-Confucian countries, such as Brazil and India, also score fairly high on the index. Although Franke, Hofstede, and Bond (1991, 2002) find LTO to be strongly correlated with economic growth, the extent to which LTO contributes to economic growth remains controversial. Yeh and Lawrence (1995) point out that culture is a necessary but not sufficient condition for economic growth. Nonetheless, an increasing number of economists are interested in the economic outcome of culture (Guiso, Sapienza and Zingales, 2003, 2006).

In this study, we examine how economic development can affect LTO. More specifically, because the value of thrift is one of the most important loading factors when compiling the index (Hofstede, 2001), we relate national wealth to LTO through saving. In fact, Read (1993) finds that LTO is significantly correlated with various measures of saving in a country, especially marginal propensity to save.

Using international comparative analysis, Edwards (1996) summarizes the important determinants of individual savings, namely, why private saving behavior of a country is related to economic development. First, how much to save is an intertemporal decision of households. According to the life cycle theory, individuals from high economic growth countries tend to increase current consumption and reduce savings when anticipating higher future income. In addition, improved financial market and fewer borrowing constraints reduce the need for precautionary savings. In other words, saving tends to decrease when income increases. However, private saving behavior is also determined by demographic factors. As economic development improves living conditions and increases longevity in developed countries, individual savings have to increase to accommodate the extra expenses needed after retirement. Thus our fifth hypothesis is as follows:

**Hypothesis 5:** Long-term orientation first decreases and then increases with (log) GDP per capita.

In the following section, we will first explain the models we use to test the relationship between Hofstede's cultural dimensions and income level and then report the empirical results.

## RESEARCH METHODS

### The Model

The institutional variables we use to explain power distance (PDI), individualism (IND), uncertainty avoidance (UAI), masculinity (MAS), and LTO are based on the existing literature as summarized in Table 2. The common variables for each model include language dummies (*English*, *German*, and *Spanish*), which indicate the primary language of a country. They are used to represent the impact of language in defining cultural clusters according to Ronen and Shenkar (1985) and Gomez-Mejia and

Palich (1997). *Catholic*, *Protestant*, and *Muslim* are dummy variables indicating the primary religion of a country. *Dethnic*, which takes the value of 1 when a country has a dominant ethnic group accounting for more than 70% of its population and zero otherwise, is used to reflect the degree of ethnic homogeneity in a country, and is included only in the equations for IND and PDI. *Common* is a dummy variable indicating whether a country's legal origin is a common law system, and is included only in the equation for UAI. *Female* is the percentage of female labor in the total labor force, and appears only in the equation for MAS. *Confucianism* is a dummy for those countries that have a Confucian tradition, which includes China, Hong Kong, Japan, South Korea, and Singapore, and is included only in the equation for LTO. Finally, *Continental*, *Subtropical*, and *Desert* are dummy variables that represent the climate type of a country and are included in the equations for PDI and MAS. To summarize, the following models are used to explain the Hofstede cultural indices.

$$\begin{aligned} \text{IND} = & \alpha_0 + \alpha_1 \log \text{GDPper} + \alpha_2 \log \text{GDPper}^2 \\ & + \alpha_3 \text{Dethnic} + \alpha_4 \text{German} + \alpha_5 \text{Spanish} \\ & + \alpha_6 \text{English} + \alpha_7 \text{Catholic} + \alpha_8 \text{Protestant} \\ & + \alpha_9 \text{Muslim} + \varepsilon_1 \end{aligned} \quad (1)$$

$$\begin{aligned} \text{PDI} = & \beta_0 + \beta_1 \log \text{GDPper} + \beta_2 \log \text{GDPper}^2 \\ & + \beta_3 \text{Dethnic} + \beta_4 \text{German} + \beta_5 \text{Spanish} \\ & + \beta_6 \text{English} + \beta_7 \text{Catholic} + \beta_8 \text{Protestant} \\ & + \beta_9 \text{Muslim} + \beta_{10} \text{Continental} \\ & + \beta_{11} \text{Subtropical} + \beta_{12} \text{Desert} + \varepsilon_2 \end{aligned} \quad (2)$$

$$\begin{aligned} \text{UAI} = & \gamma_0 + \gamma_1 \log \text{GDPper} + \gamma_2 \log \text{GDPper}^2 \\ & + \gamma_3 \text{German} + \gamma_4 \text{Spanish} + \gamma_5 \text{English} \\ & + \gamma_6 \text{Catholic} + \gamma_7 \text{Protestant} \\ & + \gamma_8 \text{Muslim} + \gamma_9 \text{Common} + \varepsilon_3 \end{aligned} \quad (3)$$

$$\begin{aligned} \text{MAS} = & \delta_0 + \delta_1 \log \text{GDPper} + \delta_2 \log \text{GDPper}^2 \\ & + \delta_3 \text{Female} + \delta_4 \text{German} + \delta_5 \text{Spanish} \\ & + \delta_6 \text{English} + \delta_7 \text{Catholic} + \delta_8 \text{Protestant} \\ & + \delta_9 \text{Muslim} + \delta_{10} \text{Continental} \\ & + \delta_{11} \text{Subtropical} + \delta_{12} \text{Desert} + \varepsilon_4 \end{aligned} \quad (4)$$

$$\begin{aligned} \text{LTO} = & \lambda_0 + \lambda_1 \log \text{GDPper} + \lambda_2 \log \text{GDPper}^2 \\ & + \lambda_3 \text{Confucianism} + \lambda_4 \text{Catholic} \\ & + \lambda_5 \text{Protestant} + \lambda_6 \text{Muslim} + \varepsilon_5 \end{aligned} \quad (5)$$

The first independent variable in Eqs. (1)–(5) is the log of a country's average GDP per capita ( $\log \text{GDPper}$ ) between 1970 and 1974 in constant 2000 US dollars. Because Hofstede's cultural scores have been standardized between zero and 100, the logarithm form of GDP per capita is used to normalize the highly skewed economic variable so that it is more amenable to least-square statistics. The data of GDP per capita are obtained from the World Bank's *World Development Indicators*. To detect the nonlinear relationship between the cultural indices and national wealth, we include the square of  $\log \text{GDPper}$  in each equation. The data for institutional variables come from Parker (1997), Stulz and Williamson (2003), Guiso et al. (2003), the GLOBE project (2004), and the US Central Intelligence Agency's *The World Fact Book*. The information on the institutional variables is available from the authors upon request.

Table 3 reports the correlations of the independent variables. The only institutional variable that has a correlation with GDP per capita above 0.5 in absolute value is tropical climate. Therefore we choose it as the drop variable in regressions to minimize the collinearity problem. In general, correlations between institutional variables are not significant, with two exceptions: the percentage of women in the labor force is significantly and negatively correlated with the dummy representing Spanish-speaking countries, and almost all English-speaking countries have a common law system. Nonetheless, correlations between institutional variables are not a major concern for this study, as the primary focus is to examine the significance of national wealth after controlling for the institutional factors.

## Results

Figures 1–5 provide the scatter plots of the average (log) GDP per capita in constant 2000 US dollars (between 1980 and 1984 for long-term orientation and between 1970 and 1974 for the others) and Hofstede's cultural dimensions. A fitted polynomial curve is added to each figure. As we can see, four out of five of Hofstede's cultural scores demonstrate a curvilinear rather than a simple linear relationship with GDP per capita before controlling for the institutional factors.



Table 3 Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Log GDP per capita	1.00														
2. % of female in labor force	0.29*	1.00													
3. Dummy of dominant ethnic group	0.34*	0.47**	1.00												
4. Dummy of English	0.27†	0.24†	0.18	1.00											
5. Dummy of Spanish	-0.22	-0.66**	-0.30*	-0.27†	1.00										
6. Dummy of German	0.28†	0.25†	-0.01	-0.12	-0.16	1.00									
7. Dummy of Confucianism	0.09	0.14	0.20	-0.13	-0.18	-0.08	1.00								
8. Dummy of Catholic	0.06	-0.47**	-0.29*	-0.24†	0.58**	0.25†	-0.31*	1.00							
9. Dummy of Protestant	0.48**	0.47**	0.33*	0.45**	-0.39**	0.21	-0.03	-0.39**	1.00						
10. Dummy of Muslim	-0.49**	-0.11	-0.36**	-0.15	-0.21	-0.09	-0.10	-0.36**	-0.22	1.00					
11. Dummy of common law	-0.06	0.30*	0.16	0.66**	-0.41**	-0.17	0.12	-0.52**	0.16	0.06	1.00				
12. Dummy of tropical climate	-0.60**	-0.16	-0.26†	-0.16	0.33*	-0.17	-0.03	0.07	-0.31*	0.08	0.06	1.00			
13. Dummy of subtropical climate	0.03	-0.27†	0.12	-0.23	0.26†	-0.13	0.03	0.29*	-0.33*	-0.17	-0.24†	-0.33*	1.00		
14. Dummy of continental climate	0.40**	0.41**	0.21	0.21	-0.29*	0.10	0.24†	-0.29*	0.40**	-0.16	0.02	-0.31*	-0.25†	1.00	
15. Dummy of desert climate	-0.22	-0.17	-0.15	-0.00	-0.09	-0.10	-0.11	-0.27†	-0.10	0.49**	0.15	-0.24†	-0.19	-0.18	1.00

†p<0.10; \*p<0.05; \*\*p<0.01.

Table 4 reports the estimation results for Eqs. (1)–(5) by controlling for the institutional factors. The estimation results for LTO are reported separately in Table 5 because the sample is different from the IBM data set. We take three steps to estimate Eqs. (1)–(5). In Model 1, we regress each Hofstede cultural dimension on institutional variables only. Then logGDPper is added into the regressions in Model 2. In Model 3, we include the square term of logGDPper to detect the curvilinear relationship. To account for the concern of reverse-causality problem in estimating Eqs. (1)–(5), we have also tried the instrumental variable approach with the number of main telephone lines per 1000 residents as the instrumental variable. The results, not reported here, are largely similar to those in Model 3. Moreover, we have also conducted robustness checks by excluding those countries that look like outliers based on Figures 1–5. The regression results with or without those countries are very similar, especially for individualism and power distance.

As Table 4 shows, individualism is positively related to GDP per capita in Model 2. In particular, adding the economic variable has significantly increased adjusted R-square from Model 1 (0.60) to Model 2 (0.74). Furthermore, there is a statistically significant U-shaped relationship between individualism and GDP per capita, as indicated by the negative coefficient on logGDPper and the positive coefficient on logGDPper<sup>2</sup> in Model 3. Thus Hypothesis 1 is confirmed. In addition, the adjusted R-square increases from 0.74 in Model 2 to 0.83 in Model 3, confirming the curvilinear relationship between individualism and GDP per capita. With respect to the control variables, both language and religion have a statistically significant impact on individualism. Meanwhile, homogeneity of a country's population increases a nation's individualism index.

For power distance, we find that including logGDPper increases adjusted R-square from 0.46 in Model 1 to 0.53 in Model 2. In addition, there is a statistically significant inverted U-shaped relationship: PDI is positively related to logGDPper while negatively related to logGDPper<sup>2</sup>. Furthermore, the adjusted R-square increases to 0.58 in Model 3. Thus Hypothesis 2 is confirmed. Meanwhile, countries with a desert climate and countries with diverse ethnic groups tend to have lower power distance than the others.

For uncertainty avoidance, the coefficients on logGDPper and logGDPper<sup>2</sup> in Model 3 return the correct signs but are not statistically significant. In

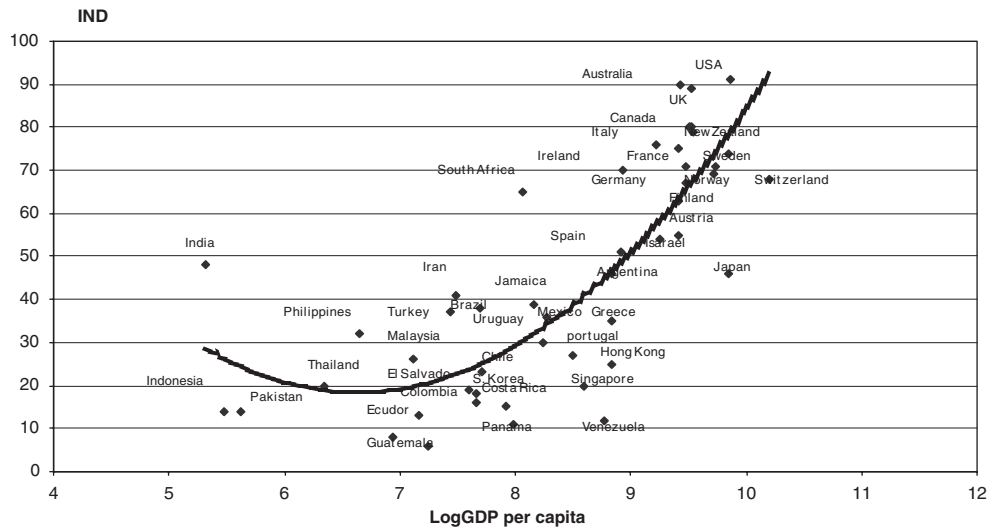


Figure 1 Individualism and log GDP per capita.

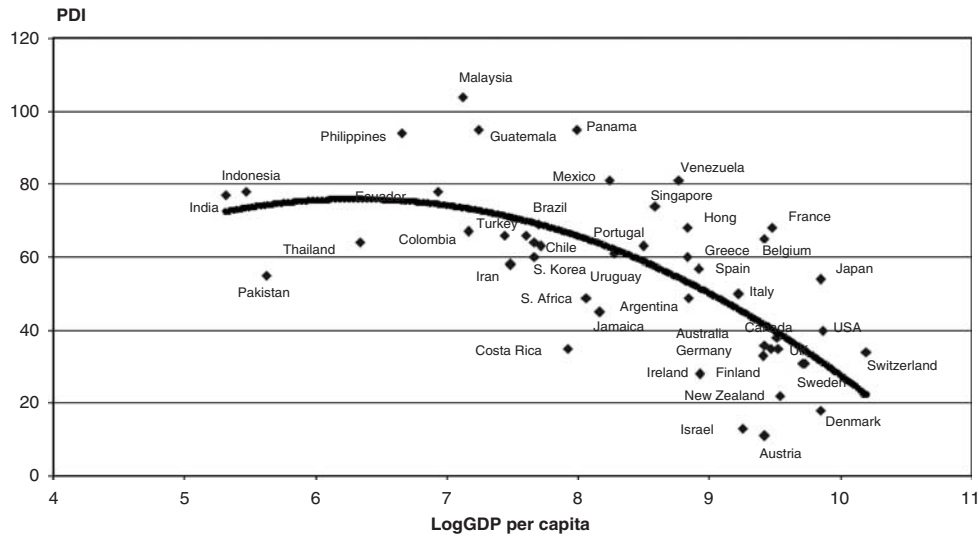


Figure 2 Power distance and log GDP per capita.

particular, adding the economic variable does not improve the explanatory power of the model, because the adjusted *R*-square actually declines slightly from Model 1 to Model 3. In other words, Hypothesis 3 is only partially confirmed. In fact, the institutional variables such as religion and legal system appear to have a more statistically significant impact on uncertainty avoidance. We find that Protestant countries and countries with a common law system have lower uncertainty indices.

As for the masculinity index, the coefficient on logGDPper is positive but insignificant in Model 2. Although it becomes negative in Model 3 after including logGDPper<sup>2</sup>, it remains insignificant.

Therefore Hypothesis 4 is not supported. With respect to the institutional variables, both German- and English-speaking countries have higher masculinity indices while Protestant countries have lower masculinity indices. Overall, when compared with individualism, power distance, and uncertainty avoidance, the econometric model for masculinity indices have relatively low explanatory power, explaining about 30% of the variations in MAS.

Finally, in Table 5, national wealth is found to have a negative impact on long-term orientation in Model 2. Although the coefficients on logGDPper and logGDPper<sup>2</sup> return the right signs, the nonlinear effect is only marginally significant in Model 3. Part

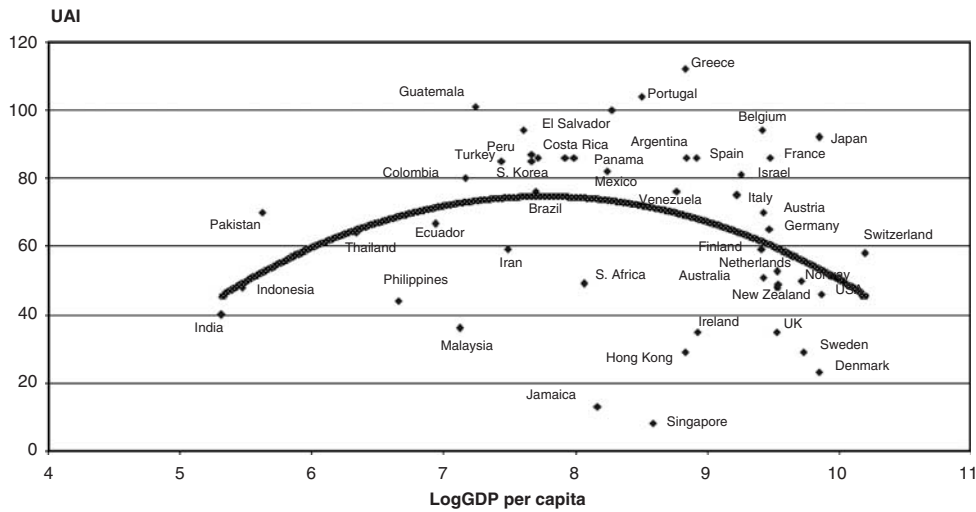


Figure 3 Uncertainty avoidance and log GDP per capita.

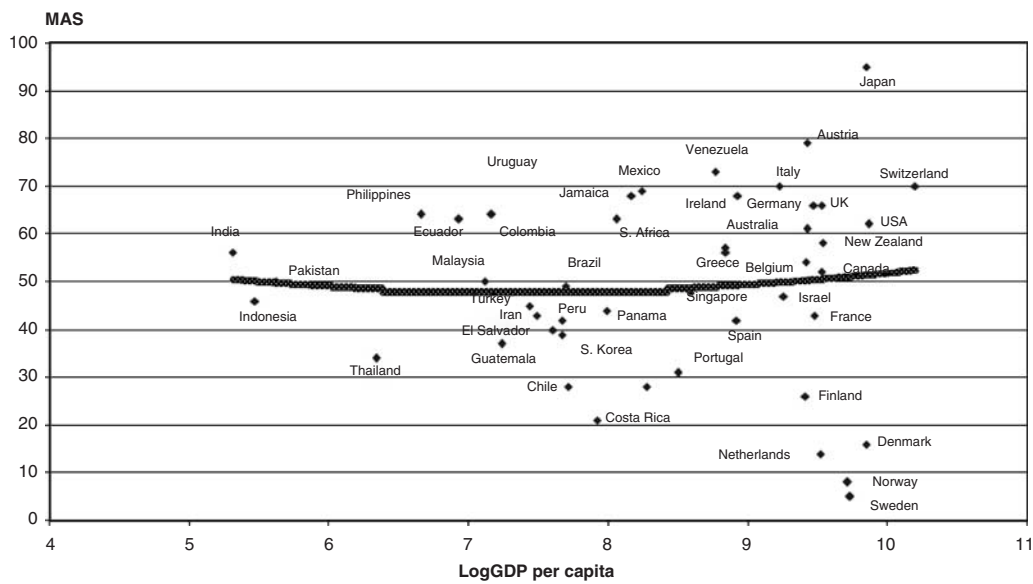


Figure 4 Masculinity and log GDP per capita.

of this is due to the small sample we have for LTO: only 22 observations. Nonetheless, including logGDPPer and logGDPPer<sup>2</sup> improves the adjusted R-square or the explanatory power of our model from 0.59 to 0.66. Therefore, Hypothesis 5 is mostly confirmed. Meanwhile, countries with a Confucian tradition do have higher LTO scores than the others, as expected.

**Validating the Updated Hofstede Cultural Indices**

Using the regression coefficients from Model 3 in Tables 4 and 5, which are based on the average GDP

per capita between 1970 and 1974, we insert the average GDP per capita between 1990 and 1994 to derive the predicted or updated Hofstede cultural scores. They are reported as PDI\_TK, IND\_TK, UAI\_TK, MAS\_TK and LTO\_TK in the Appendix, while the original Hofstede indices are denoted by PDI\_HF, IND\_HF, UAI\_HF, MAS\_HF, and LTO\_HF. To validate our estimations, we compare the correlations of the Hofstede and our updated indices with the GLOBE cultural scores in Table 6.

As previously mentioned, some differences exist between the GLOBE and Hofstede cultural

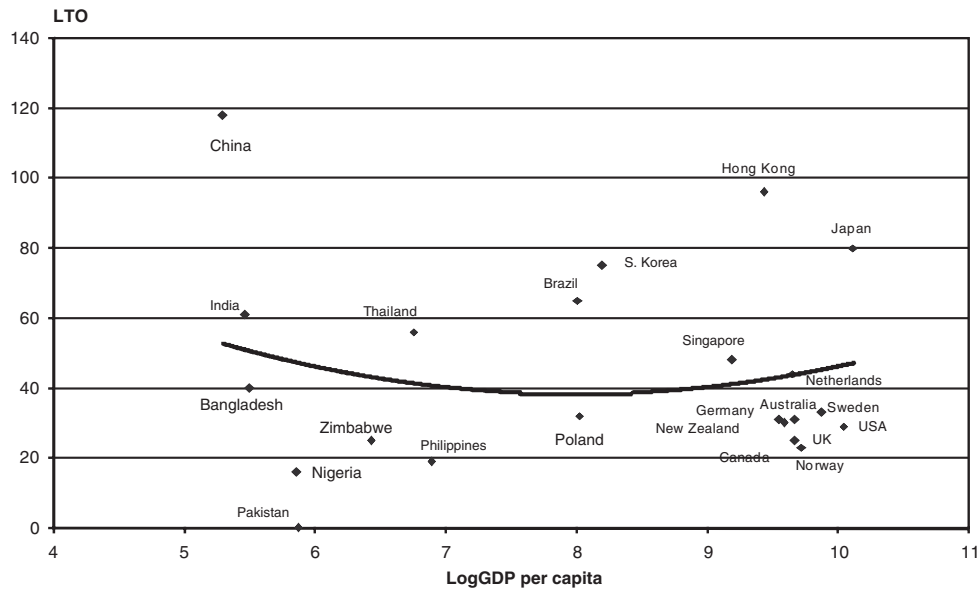


Figure 5 Long-term orientation and log GDP per capita.

dimensions. First, the GLOBE study assesses collectivism/individualism at both the societal and the organizational levels, and it measures collectivism rather than individualism directly. Thus both GLOBE's institutional and in-group collectivism indices are supposed to be negatively related to Hofstede's individualism index. Second, the GLOBE study separates Hofstede's masculinity index into two dimensions: assertiveness, which intends to reflect the masculine values of a culture; and gender egalitarianism, which is used to measure the gender trait difference between men and women as specified by Hofstede in his study. Third, the GLOBE study uses the concept of future orientation to define a society that focuses on investing and planning for its future, which is similar to the 'thrift' factor in LTO. However, the LTO dimension in Hofstede's framework also includes items such as 'persistence', 'ordering relationships by status and observing this order', and 'having a sense of shame'. Finally, the GLOBE study has two sets of indicators (i.e., values based and practices based) for national culture. As shown in column 2 of Table 6, for the 40 countries that overlap in the two studies, some of Hofstede's indices are positively related to GLOBE's practices-based scores while others are positively related to the values-based scores. Regardless of the signs, we expect our updated Hofstede indices to have higher absolute value of correlations with the GLOBE study if culture does change over time.

According to the lower half of column 3 in Table 6, our updated Hofstede scores based on GDP per capita in the 1990s have stronger correlations (in absolute terms) with the GLOBE values-based scores than the original Hofstede scores do for power distance, individualism, and uncertainty avoidance, although the difference is not significant for in-group collectivism and uncertainty avoidance. With respect to LTO, our updated index and Hofstede's original index have similar negative correlations with GLOBE's future orientation value scores. However, a positive and significant correlation exists between our updated LTO and the GLOBE practices-based future orientation, whereas the correlation between Hofstede's LTO and the GLOBE practices-based future orientation remains negative. The only exception is for assertiveness, in which our updated index has weaker correlations with both GLOBE's practices- and values-based indices than Hofstede's does. In sum, in six out of seven cases, our updated cultural indices have stronger correlations (in absolute terms) with the GLOBE values-based dimensions than the original Hofstede scores do.

As shown in the upper half of column 3 in Table 6, our updated indices do not seem to offer many advantages over the original Hofstede scores in terms of their correlations with the GLOBE practices-based indices except for institutional collectivism and future orientation. To some extent, this result reflects the puzzle brought up

**Table 4** Predictors of Hofstede's cultural dimensions ( $n=48$ )

	<i>Individualism</i>			<i>Power distance</i>		
	<i>Model 1 (OLS)</i>	<i>Model 2 (OLS)</i>	<i>Model 3 (OLS)</i>	<i>Model 1 (OLS)</i>	<i>Model 2 (OLS)</i>	<i>Model 3 (OLS)</i>
Log GDP per capita		10.26** (4.88)	-68.52** (-3.94)		-6.52* (-2.52)	46.99 <sup>†</sup> (1.90)
(Log GDP per capita) <sup>2</sup>			5.04** (4.55)			-3.41* (2.17)
Dominant ethnic group	9.01 (1.41)	6.46 (1.26)	9.62* (2.27)	-14.36* (-2.20)	-13.28* (-2.17)	-14.78** (-2.52)
German	-5.44 (-0.45)	-10.48 (-1.08)	-17.91* (-2.22)	-24.93* (-2.07)	-21.83* (-1.93)	-17.42 (-1.59)
Spanish	-30.50** (-4.09)	-23.97** (-3.93)	-16.03** (-3.04)	4.80 (0.65)	0.77 (0.11)	-3.95 (-0.55)
English	19.13* (2.53)	17.09** (2.83)	19.42** (3.92)	-11.50 (-1.53)	-10.08 (-1.43)	-11.74 <sup>†</sup> (-1.73)
Catholic	21.62** (2.75)	16.17** (2.54)	19.46** (3.71)	-4.41 (-0.55)	0.01 (0.00)	-2.18 (-0.29)
Protestant	21.65** (2.94)	12.82* (2.09)	10.21* (2.02)	-12.76 <sup>†</sup> (-1.71)	-7.06 (-0.96)	-6.41 (-0.92)
Muslim	-2.12 (-0.20)	11.80 (1.31)	14.76* (2.00)	7.05 (0.62)	-1.17 (-0.10)	-1.00 (-0.09)
Continental				-12.02 <sup>†</sup> (-1.71)	-6.69 (-0.97)	-5.79 (-0.88)
Subtropical				-5.08 (-0.74)	-1.78 (-0.27)	-4.44 (-0.70)
Desert				-16.80* (-1.98)	-13.79 <sup>†</sup> (-1.72)	-17.88* (-2.27)
Constant	26.72** (3.09)	-54.68** (-3.03)	238.42** (3.61)	78.10** (8.68)	127.53** (5.98)	-71.82 (-0.76)
F-statistics	10.89	17.93	26.28	5.08	5.86	6.32
Adjusted R-squared	0.60	0.74	0.83	0.46	0.53	0.58

Table 4 Continued

	Uncertainty avoidance			Masculinity		
	Model 1 (OLS)	Model 2 (OLS)	Model 3 (OLS)	Model 1 (OLS)	Model 2 (OLS)	Model 3 (OLS)
Log GDP per capita		1.10 (0.35)	15.58 (0.50)		0.34 (0.13)	-6.96 (-0.26)
(Log GDP per capita) <sup>2</sup>			-0.93 (-0.47)			0.47 (0.27)
% of female in labor				-0.03 (-0.05)	-0.02 (-0.05)	-0.02 (-0.04)
German	5.27 (0.38)	4.48 (0.31)	5.74 (0.39)	44.26** (3.71)	44.08** (3.63)	43.46** (3.47)
Spanish	10.11 (1.21)	10.96 (1.24)	9.68 (1.04)	0.12 (0.02)	0.36 (0.04)	0.99 (0.12)
English	11.61 (0.91)	10.45 (0.79)	9.63 (0.71)	29.83** (4.17)	29.76** (4.09)	29.98** (4.04)
Catholic	-6.48 (-0.63)	-6.40 (-0.61)	-6.56 (-0.62)	-9.35 (-1.20)	-9.55 (-1.19)	-9.31 (-1.14)
Protestant	-25.12** (-2.56)	-25.55* (-2.55)	-24.87* (-2.44)	-28.22** (-3.98)	-28.52** (-3.77)	-28.59** (-3.73)
Muslim	-9.62 (-0.88)	-7.67 (-0.62)	-7.63 (-0.61)	-11.99 (-1.19)	-11.52 (-1.06)	-11.66 (-1.05)
Common law	-32.69** (-3.08)	-31.60** (-2.83)	-31.12** (-2.75)			
Continental				-3.18 (-0.47)	-3.46 (-0.48)	-3.60 (-0.50)
Subtropical				-3.49 (-0.55)	-3.68 (-0.56)	-3.25 (-0.48)
Desert				3.20 (0.39)	3.05 (0.36)	3.62 (0.41)
Constant	82.29** (8.91)	72.62* (2.49)	17.80 (0.15)	57.62** (3.01)	54.94 <sup>†</sup> (1.91)	82.15 (0.79)
F-statistics	6.36	5.46	4.78	3.36	2.97	2.66
Adjusted R-squared	0.44	0.43	0.42	0.33	0.32	0.30

<sup>†</sup>p<0.10; \*p<0.05; \*\*p<0.01. Numbers in parentheses are *t*-statistics.

**Table 5** Predictors of long-term orientation ( $n=22$ )

	<i>Model 1 (OLS)</i>	<i>Model 2 (OLS)</i>	<i>Model 3 (OLS)</i>
Log GDP per capita		-5.00 (-1.74)	-57.53 (-1.66)
(Log GDP per capita) <sup>2</sup>			3.33 (1.52)
Confucianism	40.51** (3.53)	44.79** (4.03)	45.93** (4.28)
Catholic	-5.61 (-0.53)	-1.27 (-0.12)	4.37 (0.42)
Protestant	-12.07 (-1.37)	-4.52 (-0.48)	-3.43 (-0.38)
Muslim	-22.61 <sup>†</sup> (-1.75)	-32.86* (-2.43)	-36.81** (-2.77)
Constant	45.30** (4.91)	81.73** (3.61)	277.19* (2.12)
<i>F</i> -statistics	8.41	8.14	7.72
Adjusted <i>R</i> -squared	0.59	0.63	0.66

<sup>†</sup> $p < 0.10$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ . Numbers in parentheses are *t*-statistics.

**Table 6** Validating our updated Hofstede cultural scores

	<i>Correlations between Hofstede and Tang &amp; Koveos (1)</i>	<i>Correlations between Hofstede and GLOBE (2)</i>	<i>Correlations between GLOBE and Tang &amp; Koveos (3)</i>	<i>t-values (Blalock, 1972) for difference between (2) and (3)</i>
<i>GLOBE's practices scores</i>				
Power distance	0.79**	0.56**	0.53**	0.35
Institutional collectivism	0.87**	0.22	0.37**	-1.96*
In-group collectivism	0.87**	-0.81**	-0.82**	0.22
Uncertainty avoidance	0.71**	-0.67**	-0.57**	-1.09
Gender egalitarianism	0.66**	-0.19	-0.10	-0.68
Assertiveness	0.66**	0.30*	0.14	1.25
Future orientation	0.84**	-0.05	0.21	-3.14**
<i>GLOBE's values scores</i>				
Power distance	0.79**	-0.10	-0.28*	1.80 <sup>†</sup>
Institutional collectivism	0.87**	-0.59**	-0.71**	2.03*
In-group collectivism	0.87**	-0.33*	-0.42**	1.18
Uncertainty avoidance	0.71**	0.36**	0.49**	-1.18
Gender egalitarianism	0.66**	0.03	0.20	-1.30
Assertiveness	0.66**	0.20	0.06	1.06
Future orientation	0.84**	-0.22	-0.20	-0.22

<sup>†</sup> $p < 0.10$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ .

by the GLOBE study, namely, that a positive correlation is lacking between cultural values and practices (Javidan et al., 2006). On the other hand, it may also suggest that the GLOBE values-based indices are more consistent with the Hofstede framework than the practices-based indices.

## CONCLUDING REMARKS AND DISCUSSION

In this paper, we develop an integrated empirical model to update the Hofstede cultural dimensions. After controlling for some relatively stable institutional factors, we find that individualism, power distance, and long-term orientation demonstrate

a significant curvilinear relationship with GDP per capita, and tend to change over time. We validate our study by comparing the correlations between our updated cultural indices in the 1990s and the original Hofstede indices with dimensions from the GLOBE study. We find that our updated indices have stronger correlations with the GLOBE values-based scores than Hofstede's scores in six out of seven cases, thus reaffirming the importance of adjusting the cultural dimensions with economic conditions over time.

These findings have several important implications for future cross-cultural research. First, rather than debating the difference between the new constructs developed by other projects and the original Hofstede scores, it is worthwhile to examine whether the difference originates from the research design or from the changes associated with time. That is, it can be misleading to compare any new cultural dimensions based on current economic conditions with the original Hofstede scales developed in the 1970s. In addition, each project is unique and cannot be precisely replicated. The Hofstede framework provides five popular cultural dimensions that have been widely used in cross-cultural research in the past three decades. The GLOBE study is the first programmatic research effort that explores the effects of culture on leadership. Although the GLOBE project can arguably be considered as the new generation of the Hofstede framework, it will become dated in the future. Consequently, a model that can account for changes in economic conditions will provide the best potential for change-related adjustments.

Second, for research that uses Hofstede's indices as independent variables, we recommend including both GDP per capita and the square term of GDP per capita as control variables. On the other hand, for studies that need to derive the Kogut and Singh (1988) type of cultural distance, it is time to consider alternative measures such as the ones we offer here. Likewise, the GLOBE study is another

good alternative, as it provides the most recent and comprehensive cultural dimensions. However, the problem is that the GLOBE study will one day become obsolete as national entities continue to evolve. Therefore our model is a more permanent fix for the dynamics of Hofstede's framework, even though our updated indices still need to be validated by other researchers for both Hofstede-generated research and for future country- or culture-level studies.

In the end, it is important to note that we attempt to use a rather macro variable (i.e., national wealth) to explain the shift of national cultural values, which is composed of diverse individual personalities and attitudes. Even though the norms of a society change over time with income level, this does not imply that every individual in the country experiences the same psychological process. However, similar to the assumption that is central to Hofstede's framework, we believe that the shift of social norms reflects the changes in the attitudes shared by most people within a society, which in turn shape the issues about which people agree and disagree, and what people think is important and unimportant. An examination of how individuals respond to changes in economic conditions is beyond the scope of this study but should be on the agenda for future research. For instance, Hofstede and McCrae (2004) report that personal traits such as neuroticism and agreeableness have statistically significant correlations with uncertainty avoidance and masculinity. We believe future research in psychology and other disciplines will complement our understanding regarding the determinants of Hofstede's framework.

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## APPENDIX

See Table A1.

**Table A1** Hofstede's and our Updated Cultural Indices

Country	PDI_HF	PDI_TK	IND_HF	IND_TK	UAI_HF	UAI_TK	MAS_HF	MAS_TK	LTO_HF	LTO_TK
Argentina	49	52	46	39	86	86	56	45		33
Australia	36	24	90	88	51	35	61	55	31	29
Austria	11	18	55	66	70	80	79	89		38
Belgium	65	58	75	72	94	75	54	49		38
Brazil	69	79	38	33	76	77	49	43	65	34
Canada	39	40	80	91	48	53	52	75	23	38
Chile	63	59	23	28	86	86	28	44		34
Colombia	67	82	13	12	80	86	64	47		37
Costa Rica	35	64	15	27	86	86	21	47		34
Denmark	18	33	74	81	23	56	16	30		32
Ecuador	78	83	8	10	67	85	63	47		40
Finland	33	33	63	71	59	57	26	26		30
France	68	42	71	82	86	75	43	49		38
Germany FR	35	18	67	76	65	56	66	64	31	35
Great Britain	35	26	89	93	35	35	66	59	25	30
Greece	60	54	35	42	112	83	57	53		29
Guatemala	95	83	6	10	101	85	37	47		39
Hong Kong	68	39	25	65	29	50	57	55	96	80
India	77	71	48	20	40	46	56	57	61	56
Indonesia	78	88	14	21	48	72	46	44		8
Iran	58	71	41	21	59	74	43	48		-1
Ireland	28	37	70	92	35	54	68	78		36
Israel	13	31	54	56	81	51	47	61		32
Italy	50	41	76	77	75	75	70	45		37
Jamaica	45	52	39	53	13	37	68	57		26
Japan	54	26	46	82	92	80	95	56	80	85
Malaysia	104	85	26	27	36	44	50	44		-7
Mexico	81	56	30	24	82	86	69	51		33
Netherlands	38	36	80	92	53	50	14	20	44	34
New Zealand	22	31	79	85	49	36	58	59	30	28
Norway	31	22	69	88	50	55	8	27		35
Pakistan	55	69	14	22	70	40	50	48	0	12
Panama	95	79	11	18	86	86	44	47		34
Peru	64	78	16	11	87	86	42	44		38
Philippines	94	73	32	35	44	74	64	46	19	44
Portugal	63	53	27	60	104	76	31	44		33
El Salvador	66	68	19	21	94	86	40	47		37
Singapore	74	48	20	57	8	51	48	58	48	78
South Africa	49	35	65	52	49	37	63	61		27
South Korea	60	49	18	48	85	58	39	24	75	71



Table A1 Continued

Country	PDI_HF	PDI_TK	IND_HF	IND_TK	UAI_HF	UAI_TK	MAS_HF	MAS_TK	LTO_HF	LTO_TK
Spain	57	44	51	51	86	86	42	45		34
Sweden	31	29	71	78	29	56	5	26	33	31
Switzerland	34	22	68	82	58	54	70	65		39
Thailand	64	74	20	17	64	51	34	55	56	34
Turkey	66	53	37	35	85	75	45	47		-6
Uruguay	61	55	36	34	100	86	28	44		33
USA	40	12	91	105	46	34	62	57	29	34
Venezuela	81	74	12	25	76	86	73	48		33
Bangladesh									40	22
China									118	96
Poland									32	34
Nigeria									16	14
Zimbabwe									25	41

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