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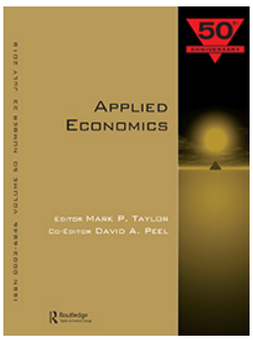
A Closer Look at the Determinants of International Migration: Decomposing Cultural Distance

Roger White
Whittier College, rwhite1@whittier.edu



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A closer look at the determinants of international migration: decomposing cultural distance

Roger White[a] and David Buehler[b]

[a]Department of Economics, Whittier College, Whittier, CA, USA; [b]School of Business Administration, Pennsylvania State University - Harrisburg, Middletown, PA, USA

ABSTRACT

Using a modified gravity model and three measures of cultural distance, we employ the zero-inflated negative binomial estimation technique to examine the impact of cultural distance on international migration flows. We confirm the finding of prior studies that there exists a negative relationship between composite measures of cultural distance and immigrant flows. Extending the literature, we decompose our composite cultural distance measures into their component dimensions to examine potential variability in the influences of individual dimensions on international migration. We find the cultural dimensions that reflect individualism, uncertainty avoidance, and perceived gender roles are typically more influential in determining immigrant flows than are other cultural dimensions.

KEYWORDS

Cultural distance; gravity; migration; zero-inflated negative binomial regression

JEL CLASSIFICATION

F02; F15; F22

I. Introduction

Studies of the determinants of international migration have often focused on the economic characteristics of source and destination countries (e.g. Borjas 1987; Borjas, Bronars, and Trejo 1992; Carrington, Detragiache, and Vishwanath 1996; and Chiswick 1999). Several recent works have also considered the role of culture and, more specifically, the potential influence of cultural differences between migrants' source and destination countries on the choice of destination (i.e. Belot and Ederveen 2012; White 2013; Wang, De Graaff, and Nijkamp, 2014; and White and Yamasaki 2014). Cultural differences can be interpreted as differences in societal beliefs, values, attitudes, and traditions and, as such, may constitute additional indirect costs faced by potential migrants. Falck, Lameli, and Ruhose (2015), for example, quantify migration costs for individuals moving to culturally-different locations within Germany and show that migrants demand a wage premium to overcome the additional costs associated with migrating between culturally-different locations. This suggests that cultural distance may reduce migration flows and lead to smaller immigrant stocks. In fact, the literature uniformly identifies a negative relationship between composite measures of cultural distance and migration.

The few studies that have considered a relationship between cultural differences and international migration have employed composite measures of cultural differences (i.e. cultural distance) or variables which serve as proxies for cultural differences. Our work is the first to consider the potential impacts on migration that are attributable to differences in the underlying component dimensions of composite source-destination cultural distance measures. Thus, the primary contributions of this article are the provision of a more detailed understanding of the cultural distance-migration relationship and the identification of potential corresponding implications for immigration policy, as well as domestic policy, which may indirectly affect migration flows.

The basis for our study is simple: while a negative relationship between cultural differences and international migration has been documented, little else is known of this relationship. To provide a more complete understanding of the relationship, we first confirm the documented negative relationship between three different composite measures of cultural distance and migration. We then decompose each of the measures into the respective component

CONTACT Roger White rwhite1@whittier.edu Department of Economics, Whittier College, 13406 Philadelphia Street, Whittier, CA 90608, USA

dimensions and evaluate their influences on migration. The expected variability in the cultural dimension-migration relationship at this level of detail allows for a more complete understanding of the forces that underlie international migration.

As noted, few works have considered a relationship between cultural distance and international migration. Belot and Ederveen (2012) examine immigrant flows between 22 OECD member countries during the years 1990–2013. White (2013) examines migration from 66 source countries to Denmark, Germany, and the Netherlands during the years 1997–2002. Both studies employ the negative binomial estimation technique. Belot and Ederveen utilize several cultural distance measures (i.e. religious distance, linguistic distance, and survey-based measures) and report a consistent negative relationship between cultural distance and migration flows. Extending the literature, White confirms that greater cultural distance between source and destination countries hinders migration; however, a larger existing stock of immigrants is found to correspond with larger subsequent migration flows between their source and destination countries, with the influences of existing immigrant stocks on subsequent flows being greater for more culturally distant country pairs. Thus, White posits that existing immigrant stocks offset, at least in part, the migration-inhibiting influences of cultural distance.

White and Yamasaki (2014) employ the zero-inflated negative binomial technique to examine data for 79 immigrant source countries and six OECD member destination countries during the years 1975–2000. Again, it is confirmed that greater cultural differences inhibit migration. Allowing educational attainment to proxy for skill, the authors document variation across low-, medium-, and high-skilled immigrant cohorts both in terms of the cultural distance-migration relationship and in the extent to which existing immigrant stocks offset the influence of cultural distance. Wang, De Graaff, and Nijkamp (2014) perform a regional analysis to consider the attractiveness of socio-cultural composition to potential migrants. Using a two-stage lease squares approach, the authors find that adult first-generation immigrants prefer to move to regions that have cultural backgrounds similar to theirs. Similarly, when comparing the attractiveness of 61 regions in 20 European countries to migrants, a significant and robust negative correlation is found between average cultural distance and attractiveness.

Extending from earlier works, we use the zero-inflated negative binomial regression technique to examine annual data that represent large, heterogeneous sets of 102 source countries and 36 destination countries during the 1982–2013 period. We first confirm the documented negative relationship between composite measures of cultural distance and migration. We then decompose the composite measures into their component dimensions. The corresponding coefficient estimates reveal considerable variation in the signs, magnitudes, and statistical significance, of the respective influences of cultural dimensions on migration.

We find the cultural dimensions most related to gender roles and an individual's ability to improve one's status within a society are the most influential components in the link between cultural distance and migration among country pairs. As such, domestic and/or immigration policies that enhance gender equality or that promote opportunities for individuals to increase the wellbeing of themselves and their families are likely to promote migration from countries with similar cultural characteristics while simultaneously inhibiting migration from countries where such opportunities are less common. Accordingly, we provide a more detailed and more complete understanding of the complex relationship between cultural differences and migration.

Our econometric specification and data are introduced in Section II. Section III provides detailed descriptions of the cultural distance measures that we employ and discuss the respective component dimensions. Empirical results are presented in Section IV, while Section V concludes.

II. Empirical specification and data

We follow Lewer and Van Den Berg (2008) and adapt the gravity model of international trade to international migration, a strategy employed in recent, related works on this topic.[1] The frequency of the model's use, coupled with its flexibility in terms of the generation of empirical specifications that correspond with our research questions, makes the gravity model an excellent tool for our purposes. Equation (1) illustrates our empirical specification:

[1]See Belot and Ederveen (2012), White (2013), and White and Yamasaki (2014).

$$FLOW_{ijt} = \alpha_0 + \beta CD_{ijt} + \gamma X_{ijt} + \delta M_{ijt} + \beta_\varphi \varphi_i + \beta_\Omega \Omega_j + \beta_\phi \phi_t + \varepsilon_{ijt} \quad (1)$$

The dependent variable series ($FLOW_{ijt}$) is the number of persons that migrated from source country i to destination country j during year t (OECD, 2016). CD_{ijt} is a vector that includes three composite cultural distance measures and their corresponding component dimensions.[2] Equation (1) is estimated, in turn, employing each of the three composite cultural distance measures and then while employing the corresponding differences in component cultural dimensions for each source-destination country pair. Given the importance of the cultural distance measures for our analysis, we provide a detailed discussion of these variables in Section 3.[3] Here, we focus on the remaining variables in our estimation equation.

The vector X_{ijt} contains traditional gravity model variables. Specifically, X_{ijt} includes the ratio of destination-to-source country real GDP per capita values, the geodesic distance between the countries, and the product of their populations. All three variables enter Equation (1) in natural logarithms. A higher destination-to-source real GDP per capita ratio is expected to attract individuals who view migration as a means to improve their economic position. Geodesic distance serves as a measure of direct migration costs; thus, we anticipate that greater physical distance will correspond with reduced migration flows. Finally, the product of source and destination countries' populations is a measure of population mass. A greater value may indicate a higher likelihood that migration occurs between the source and destination country pair and that more migration occurs between the two countries. Two dummy variables are also included – one which identifies source and destination countries that share a common border and another that identifies country pairs that have (or had) a colonial relationship.[4]

The vector M_{ijt} includes variables more specifically related to migration models. This includes the existing immigrant stock from source country i that lived in destination country j during the previous year (International Migration Database 2016). A larger existing immigrant stock from a potential migrant's source country is expected to facilitate larger immigrant inflows if the existing stock is able to reduce direct migration costs related to travel, finding housing, and obtaining employment. Further, a larger existing immigrant stock can serve to reduce indirect migration costs associated with cultural differences (White 2013; White and Yamasaki 2014). The vector also includes the unemployment rates of the source and the destination countries to reflect labor market conditions. We anticipate that higher source country unemployment rates and lower destination country unemployment rates will correspond with greater migration flows.

We include fixed effects terms to capture time-invariant source and destination country-specific attributes (denoted by φ and Ω, respectively) that may influence bilateral migration flows. Similarly, to represent time-specific influences, we control for year fixed effects (denoted by ϕ). Finally, ε is an assumed i.i.d. error term. Table 1 presents descriptive statistics for the three data samples that correspond to each composite measure of cultural distance.

III. Composite measures of cultural distance and their component dimensions

The inglehart measure of cultural distance

The Inglehart measure is constructed using data from the World Value Surveys (WVS).[5] The surveys elicit views related to economics, politics, and technological advances while also covering topics such as family values, gender roles, environmental issues, sexual orientation, and religion (Inglehart et al. 2004). We posit that the data represent the attitudes, values, behaviours and norms of the societies in which the survey has been administered and that differences across societies, as reflected by survey responses, reflect cross-societal cultural differences.

Two component cultural dimensions are generated from the WVS data: Survival vs. Self-expression values (*SSE*) and Traditional vs. Secular-rational

[2]All countries for which complete data are available are listed in the Appendix. For the estimations that employ the Inglehart measure of cultural distance, complete data are available for 90 immigrant source countries and 36 destination countries. The estimations that use the Hofstede cultural distance measures include data for 77 source countries and 35 destinations countries, while data are available for data are available for 55 source countries and 27 destinations when the GLOBE measure of cultural distance is employed.

[3]The data for the cultural distance measures we employ in this analysis is available upon request from the authors.

[4]The source for the geodesic distance variable and both dummy variables is the CEPII (2016). The source for the real GDP per capita and population series is the World Bank (2016).

[5]Unless otherwise noted, descriptive information in this section is from Inglehart and Baker (2000).

Table 1. Descriptive statistics.

		Inglehart	Hofstede	GLOBE			Inglehart	Hofstede	GLOBE
		N = 8,993	N = 16513	N = 9,489			N = 8,993	N = 16513	N = 9,489
	Exp. sign	(a)	(b)	(c)		Exp. sign	(a)	(b)	(c)
Immigrant Flow$_{ijt}$	.	3597.442	2618.647	3714.57	$\lvert FUTURE_i - FUTURE_j \rvert$	−	.	.	0.5721
		(11856.23)	(9363.93)	(11976.33)			.	.	(0.3730)
Inglehart Cultural Distance$_{ijt}$	−	1.9746	.	.	$\lvert GEND\text{-}EGL_i - GEND\text{-}EGL_j \rvert$	−	.	.	0.3784
		(0.9623)	.	.			.	.	(0.2750)
$\lvert SSE_{it} - SSE_{jt} \rvert$	−	1.4144	.	.	$\lvert HUMANE_i - HUMANE_j \rvert$	−	.	.	0.4893
		(0.9206)	.	.			.	.	(0.3437)
$\lvert TSR_{it} - TSR_{jt} \rvert$	−	1.1594	.	.	$\lvert PERFORM_i - PERFORM_j \rvert$	−	.	.	0.4282
		(0.8125)	.	.			.	.	(0.3109)
Hofstede Cultural Distance$_{ij}$	−	.	2.3003	.	$\lvert POWDIST_i - POWDIST_j \rvert$	−	.	.	0.4664
		.	(1.2910)	.			.	.	(0.3638)
$\lvert PDI_{it} - PDI_{jt} \rvert$	−	.	28.3198	.	$\lvert UNC\text{-}AVD_i - UNC\text{-}AVD_j \rvert$	−	.	.	0.7957
		.	(18.2833)	.			.	.	(0.7957)
$\lvert IDV_{it} - IDV_{jt} \rvert$	−	.	31.4895	.	*Relative GDP per capita*$_{ijt}$	+	16.1885	14.6665	9.6397
		.	(20.0664)	.			(30.4028)	(26.5325)	(15.6477)
$\lvert MAS_{it} - MAS_{jt} \rvert$	−	.	28.6123	.	*Geodesic Distance*$_{ij}$	−	5770.24	5979.69	6396.71
		.	(19.4064)	.			(4,573.405)	(4,720.277)	−4,880.37
$\lvert UAI_{it} - UAI_{jt} \rvert$	−	.	24.3960	.	*Population*$_{it}$ (Destination) (mil.)	+	49.4238	40.0174	49.6601
		.	(17.0599)	.			(80.0277)	(72.8406)	(79.5869)
$\lvert PRA_{it} - PRA_{jt} \rvert$	−	.	24.2933	.	*Population*$_{jt}$ (Source) (mil.)	+	105.7026	85.4726	106.0014
		.	(16.6316)	.			(254.0115)	(220.977)	(257.173)
$\lvert IND_t - IND_{jt} \rvert$	−	.	23.7767	.	*Immigrant Stock*$_{ijt\text{-}1}$	+	80772.18	55936.89	84657.81
		.	(16.5216)	.			(469,560.9)	(351,738.1)	(460,350.9)
GLOBE Cultural Distance$_{ij}$	−	.	.	2.8675	*Colony*$_{ij}$	+	0.0655	0.0524	0.0650
		.	.	(0.9976)			(0.2474)	(0.2228)	(0.2466)
$\lvert ASSERT_i - ASSERT_j \rvert$	−	.	.	0.4196	*Common Border*$_{ij}$	+	0.0632	0.0580	0.0571
		.	.	(0.2971)			(0.2433)	(0.2338)	(0.2321)
$\lvert INST\text{-}COL_i - INST\text{-}COL_j \rvert$	−	.	.	0.5183	*Unemployment Rate*$_{jt}$ (Destination)	−	7.0214	6.8540	7.3527
		.	.	(0.3826)			(3.6545)	(3.6686)	(3.6894)
$\lvert INGP\text{-}COL_i - INGP\text{-}COL_j \rvert$	−	.	.	1.0186	*Unemployment Rate*$_{it}$ (Source)	+	8.5674	8.3408	7.8359
		.	.	(0.6461)			(5.5042)	(4.7455)	(4.4528)

Standard deviations in parentheses. Values in columns (a) through (c) correspond with samples for which results are presented in Table 2 through 4, respectively.

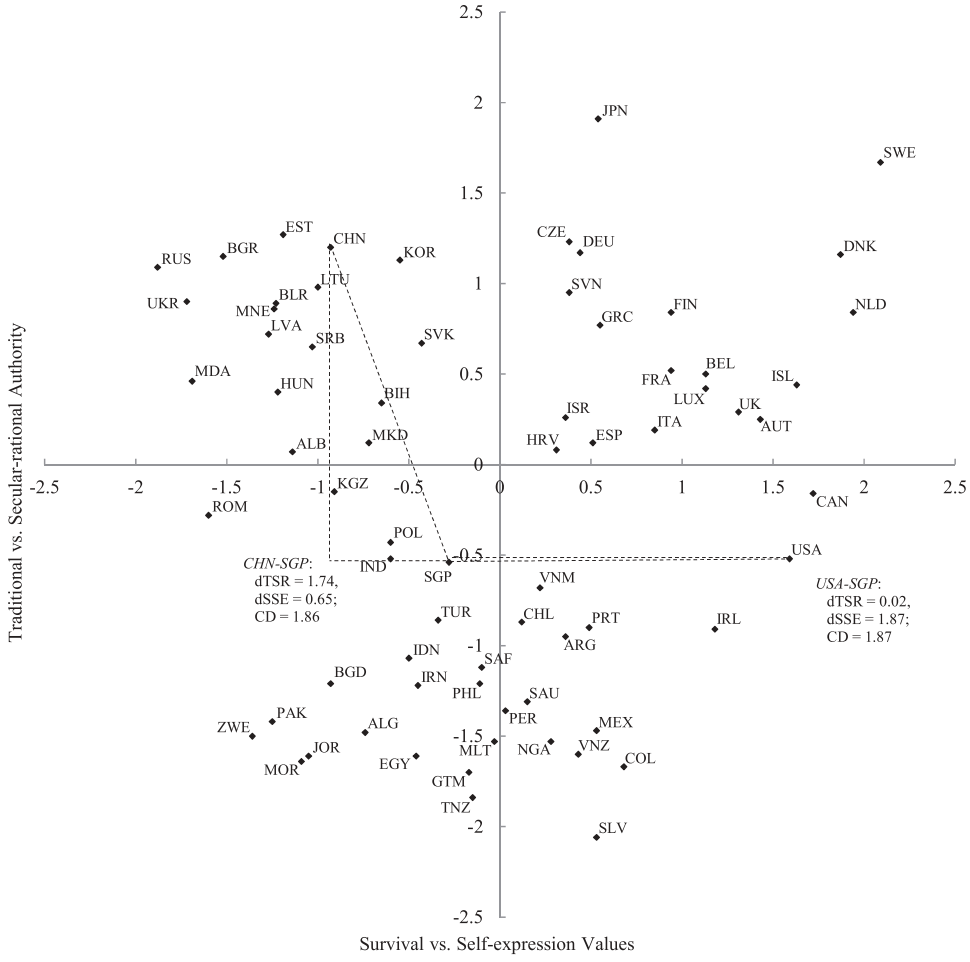

Figure 1. Inglehart 'Cultural Map' of the World, WVS Wave 4 (1999–2004).

authority (*TSR*).[6] Figure 1 provides a 'cultural map of the world' that is based on data from the fourth WVS wave.[7] To illustrate the calculation of this composite measure, distances between two country pairs are provided in the figure.

Members of more traditional societies often exhibit deference to the authority of the nation, a god, or the family. Such deference is viewed as important or as a general expectation. Commonly, members of traditional societies adhere to family or communal obligations, express a high degree of national pride and/or to have a nationalistic outlook, and show obedience to religious authority. In fact, the importance of religion is linked to many characteristics of traditional societies. There is an emphasis placed on the family, and traditional societies tend to have high fertility rates, and divorce, abortion, euthanasia, and suicide are viewed very negatively. Secular-rational societies hold opposing views on these issues, often adhering to rational-legal norms, emphasizing economic accumulation and individual achievement.

Members of survival-oriented societies often emphasize hard work, self-denial, and the achievement of economic and physical security. Often, these societies see foreigners and outsiders as threats and view ethnic diversity and cultural change negatively. This is consistent with an intolerance towards outgroups, such as homosexuals and minorities, and an adherence to traditional gender roles. For example, members of survival-oriented societies often believe that post-secondary education, jobs, and political activity are better-suited for men than for women. Similarly, survey respondents who are categorized as being more survival-oriented often have an authoritarian political

[6]Distilling something as unique as culture into two dimensions may appear overly simplistic; however, the two dimensions explain more than 70 percent of the cross-cultural variance on scores for more specific values/questions.

[7]The Inglehart cultural distance measure is constructed, following White (2010), using country-level mean values as $CD_{ijt} = \sqrt{(SSE_{it} - SSE_{jt})^2 + (TSR_{it} - TSR_{jt})^2}$.

outlook, favour increased government or state ownership of businesses, and are more open to structures of government besides democracy. Individuals in societies that place greater emphasis on self-expression values typically hold opposing views on these and related issues. The rationale is that when economic security and physical security exist cultural diversity begins to be appreciated and sought out. This leads to greater tolerance for deviation from traditional gender roles and sexual norms and to greater support for equal rights.

We posit that while cultural distance, as represented by composite measures, has been found to hinder migration, variation likely exists among the influences of individual cultural dimensions on migration. The example depicted in Figure 1 demonstrates. The Inglehart cultural distance between Singapore and the United States is 1.87. Quite similarly, the cultural distance between Singapore and China is 1.86. Even though the composite values are nearly identical, the country pairs are quite different in terms of component cultural dimension values. Singapore and the USA differ along the TSR and SSE dimensions by 0.02 and 1.87, respectively, while Singapore and China differ along the TSR dimension by 1.74 and along the SSE dimension by 0.65. Considering only composite measures of cultural distance will lead to the erroneous conclusion that cultural differences equally affect migration between the country pairs. Examining differences across component cultural dimensions, however, allows for a more accurate and more complete depiction of the relationship.

The hofstede measure of cultural distance

The Hofstede measure is based on six cultural dimensions.[8] Four of these dimensions are from surveys conducted during the late 1960s and the early 1970s. The surveys sought to collect information, across countries, on employee values. The remaining two dimensions were added in recent years (Hofstede, Hofstede, and Minkov 2010). Panel A of Figure 2 presents Hofstede measures of cultural distance between 10 countries.[9] Panel B provides the dimension scores for these countries, and the graphs depict both composite cultural differences between select countries and differences across the six cultural dimensions.

The Power Distance Index (PDI) reflects how society's members view inequalities (in wealth, power, or social status). Societies with higher PDI scores tend to be more willing to accept a strict hierarchical order, while societies with lower PDI values wish to have a more equal distribution of power among its members and/or seek justifications for inequalities.

The Individualism vs. Collectivism (IDV) dimension represents how individuals live together. Members of societies with high IDV scores are self-oriented, likely to formulate self-identities based on the individual rather than their role within a group, and often believe that each person has a right to a private life. Such individuals, being geared towards the care of themselves and immediate family, base decisions largely on their needs and the needs of those closest to them. Members of more collectivist-oriented societies base self-identity on the social system rather than the individual.

The Masculinity vs. Femininity (MAS) dimension focuses on the implications of biological differences on the emotional and social roles of women and men: 'Masculinity stands for a society in which social gender roles are clearly distinct: Men are supposed to be assertive, tough, and focused on material success; women are supposed to be more modest, tender, and concerned with the quality of life' while '[f]emininity stands for a society in which social gender roles overlap: Both men and women are supposed to be modest, tender, and concerned with the quality of life' (Hofstede 2001, 297).

The Uncertainty Avoidance Index (UAI) measures how comfortable a society is when dealing with the uncertainty of unstructured situations. Members of societies with high UAI values favor structured environments and seek to reduce the amount of uncertainty they face. These individuals are more conservative with respect to social norms, adhere to traditional gender roles, have limited interest in political matters, favor more laws and safety/security measures, and view citizen protests unfavorably. Individuals in societies with low UAI values minimize the number of rules or laws that govern daily life, are more tolerant of diversity,

[8]Unless otherwise noted, the information provided in this section is from Hofstede (2012; 2001; and 1980).

[9]Following Kogut and Singh (1988), the composite Hofstede measure of cultural distance is calculated as $CD_{ij} = \sum_{k=1}^{6}\left[\frac{(I_{ik}-I_{jk})^2}{V_k}\right]/6$, where I is the index value for the kth cultural dimension, and V is the variance of the kth cultural dimension series.

Panel A: Cultural Distances

	ARG	AUS	CAN	CHN	IND	IRN	SGP	USA	VNM	ZMB
ARG	0.00	1.22	1.06	3.61	1.78	0.55	3.63	1.35	2.32	0.84
AUS	1.22	0.00	0.15	4.61	2.22	1.51	3.98	0.03	3.30	1.76
CAN	1.06	0.15	0.00	3.49	1.56	1.14	2.85	0.12	2.27	1.16
CHN	3.61	4.61	3.49	0.00	0.75	2.60	0.57	4.18	0.68	1.79
IND	1.78	2.22	1.56	0.75	0.00	0.85	0.94	1.93	0.48	0.54
IRN	0.55	1.51	1.14	2.60	0.85	0.00	2.25	1.51	1.09	0.13
SGP	3.63	3.98	2.85	0.57	0.94	2.25	0.00	3.59	0.32	1.37
USA	1.35	0.03	0.12	4.18	1.93	1.51	3.59	0.00	3.04	1.69
VNM	2.32	3.30	2.27	0.68	0.48	1.09	0.32	3.04	0.00	0.50
ZMB	0.84	1.76	1.16	1.79	0.54	0.13	1.37	1.69	0.50	0.00

Panel B: Cultural Dimensions

	PDI	IDV	MAS	UAI	PRA	IND
ARG	49	46	56	86	20	62
AUS	36	90	61	51	21	71
CAN	39	80	52	48	36	68
CHN	80	20	66	30	87	24
IND	77	48	56	40	51	26
IRN	58	41	43	59	14	40
SGP	74	20	48	8	72	46
USA	40	91	62	46	26	68
VNM	70	20	40	30	57	35
ZMB	60	35	40	50	30	42

Panel C: Radar Graphs

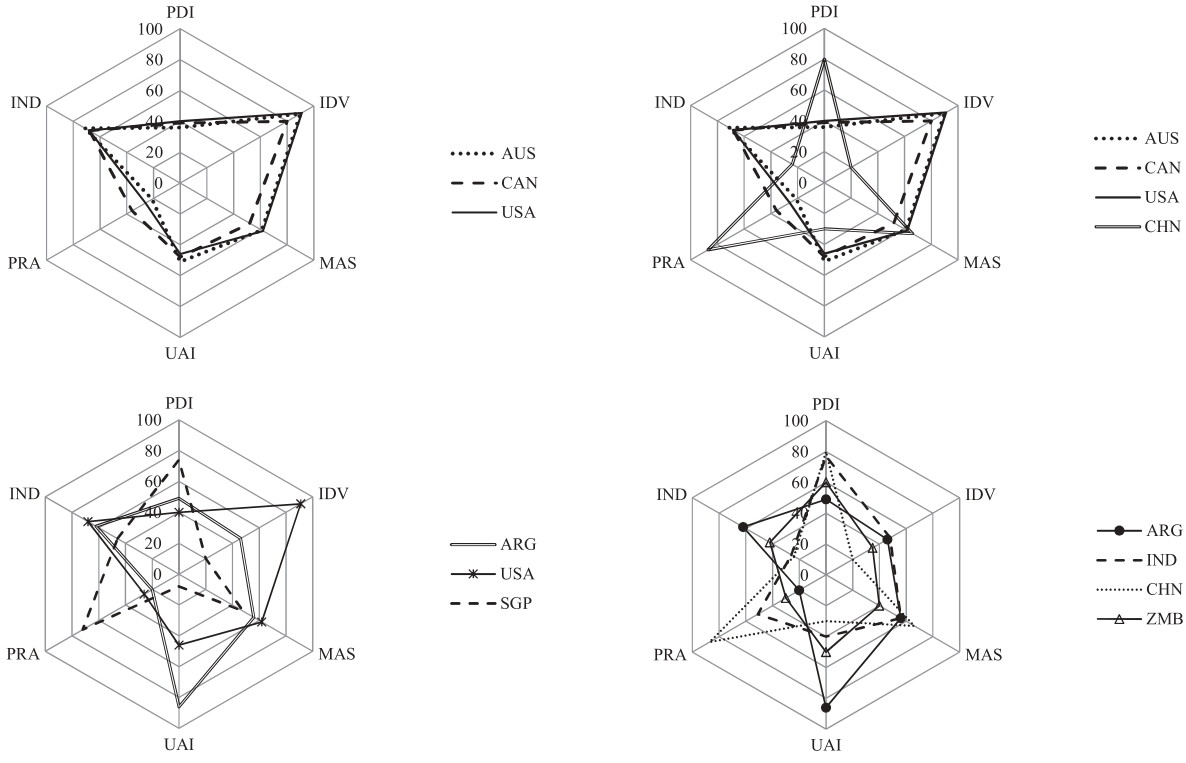

Figure 2. Hofstede cultural distances, select country-pairs.

maintain a strong interest in politics, and are more open to non-traditional gender roles.

The Pragmatic vs. Normative (PRA) dimension represents how a culture addresses the fact that much of what occurs in the world and what we experience appears unexplainable. Members of societies with high PRA scores do not believe it is possible to understand all that happens in our lives: What is 'true' is very much situation- or context-specific. These individuals have a greater ability to accept apparent contradictions and they quickly adapt when faced with changing circumstances. Individuals in more normative-oriented societies are often suspicious of societal change and exhibit a preference for traditions and established norms. They seek to explain most or all of what we observe in the world and experience in our lives: Identifying a known 'truth' is important as it corresponds with a desire for greater personal stability and respect for social conventions and traditions.

Finally, the Indulgence vs. Restraint (IND) dimension represents the extent to which a society allows/encourages the satisfaction of desires and impulses that yield pleasure and happiness. Members of societies that are more indulgent in nature (i.e. that have high IND scores) are characterized as having limited control over their impulses or lack the desire to control impulses. Individuals in more restraint-oriented societies have more control over their impulses or exhibit a greater need/willingness to adopt external controls to suppress impulses.

As with the Inglehart measure, closer examination of Hofstede cultural differences demonstrates the need to consider the component cultural dimensions. Consider the composite cultural distances between various

countries listed in Panel A of Figure 2. The graphs in Panel C depict differences across component dimensions. The upper left graph presents three countries (i.e. Australia, Canada, and the USA) with similar scores for all component dimensions and, thus, which are identified by the Hofstede measure as being culturally similar. The upper right graph includes China, illustrating stark differences across several cultural dimensions.

The need to consider individual components rather than composite cultural differences is further demonstrated in the bottom two graphs in Figure 2. The Hofstede cultural distances between Singapore and both the United States and Argentina are quite similar. However, looking to the lower left graph, we see considerable differences across the component cultural dimensions. For example, Singapore and the USA differ in terms of the IDV dimension by 71. The corresponding difference between Singapore and Argentina is only 26. Similarly, the US and Singapore differ along the PRA dimension by 38, while the difference for this dimension between Singapore and Argentina is 78. Two other country pairs with similar composite cultural distance values (i.e. Argentina–Indonesia and China–Zambia) are shown in the bottom right graph. Again, both country pairs differ to large degrees across individual cultural dimensions despite similar composite distances. Our goal is to determine the extent to which such differences influence migration flows.

The GLOBE cultural distance measure

The GLOBE measure is based on data collected during 1991–1994 as part of Project GLOBE (global leadership and organizational behaviour effectiveness).[10] The GLOBE study scored 62 participant societies in 58 countries across nine cultural dimensions. Six of the dimensions are similar to four Hofstede cultural dimensions. Thus, in this sense, the GLOBE study extends Hofstede's research (Magnussen et al., 2008). The GLOBE measure of cultural distance is constructed using these nine cultural dimension scores and the methodology of Kogut and Singh (1988). Estimated distances for 11 countries are presented in Panel A of Figure 3. Corresponding cultural dimension scores are provided in Panel B and, once again, we include graphs to illustrate differences across cultural dimensions between select societies.

The Assertiveness (ASSERT) cultural dimension represents the level of aggressiveness and confrontation that a society's members exert in relationships with other members. The Gender Egalitarianism (GEND-EGL) dimension measures a society's attitudes towards gender inequality. Together, these two dimensions are similar to Hofstede's MAS dimension. However, the GLOBE measures distinguish between assertiveness across all members of society and across genders. While this distinction could be seen as trivial, the specific inclusion of a measure of attitudes towards gender inequality reveals unique influences on migration flows.

The Institutional Collectivism (INST-COL) and In-Group Collectivism (INGP-COL) dimensions are closely related to the Hofstede IDV dimension. The INST-COL dimension measures the extent to which society's institutional practices are directed at collective goals. The INGP-COL dimension involves individuals' loyalty to their organizations, which includes families. Similar to the Hofstede measure of individualism, these two GLOBE dimensions embody an individual's ability to pursue goals related to improvement of one's own status, the well-being of society as a whole, or a smaller sub-group such as their family.

Two additional GLOBE dimensions are similar in name and description to corresponding Hofstede dimensions: Power Distance (POWDIST) and Uncertainty Avoidance (UNC-AVD). POWDIST is a measure of the expected distribution of power within a society. UNC-ADV reflects how societal norms and institutions are relied upon to alleviate unpredictability. Again, for comparison, the Hofstede UAI measure reflects a society's tolerance for uncertainty.

Three additional dimensions in the GLOBE data, Future Orientation (FUTURE), Human Orientation (HUMANE), and Performance Orientation (PERFORM), are connected to how behaviours are rewarded within a society. FUTURE embodies a society's attitude towards planning for the future and delaying gratification. The HUMANE dimension attempts to measure how much a society encourages fairness and altruism. Finally, the PERFORM dimension reflects attitudes towards innovation and high standards.

[10]Unless otherwise noted, the information presented in this section is from House et al. (2004).

Panel A: Cultural Distances

	ARG	CAN	CHE	ENG	FRA	GER	KOR	MEX	QAT	USA	VEN
ARG	0.00	3.13	5.43	2.34	1.70	2.28	3.47	4.00	2.38	2.26	0.32
CAN	3.13	0.00	1.49	0.58	1.48	2.48	3.73	2.11	0.93	0.41	2.34
CHE	5.43	1.49	0.00	1.33	1.98	1.62	3.94	3.02	3.61	1.26	5.20
ENG	2.34	0.58	1.33	0.00	0.54	1.14	3.26	2.96	1.30	0.55	1.93
FRA	1.70	1.48	1.98	0.54	0.00	0.86	3.00	3.17	1.84	1.06	1.87
GER	2.28	2.48	1.62	1.14	0.86	0.00	3.52	4.19	3.17	1.54	2.66
KOR	3.47	3.73	3.94	3.26	3.00	3.52	0.00	4.71	3.57	2.65	3.57
MEX	4.00	2.11	3.02	2.96	3.17	4.19	4.71	0.00	3.47	1.72	3.59
QAT	2.38	0.93	3.61	1.30	1.84	3.17	3.57	3.47	0.00	1.20	1.28
USA	2.26	0.41	1.26	0.55	1.06	1.54	2.65	1.72	1.20	0.00	1.78
VEN	0.32	2.34	5.20	1.93	1.87	2.66	3.57	3.59	1.28	1.78	0.00

Panel B: Cultural Dimensions

	ASSERT	INST-COL	INGP-COL	FUTURE	GEND-EGL	HUMANE	PERFORM	POWDIST	UNC-AVD
ARG	4.18	3.66	5.51	3.10	3.44	3.94	3.63	5.56	3.63
CAN	4.09	4.36	4.22	4.4	3.66	4.51	4.46	4.85	4.54
CHE	4.58	4.20	4.04	4.80	3.12	3.73	5.04	5.05	5.42
ENG	4.23	4.31	4.08	4.31	3.67	3.74	4.16	5.26	4.7
FRA	4.44	4.20	4.66	3.74	3.81	3.60	4.43	5.68	4.66
GER	4.77	3.67	4.59	4.04	3.17	3.45	4.16	5.70	5.19
KOR	4.36	5.20	5.71	3.90	2.45	3.73	4.53	5.69	3.52
MEX	4.31	3.95	5.62	3.75	3.5	3.84	5.07	3.97	4.06
QAT	4.39	4.78	5.07	4.08	3.86	4.79	3.76	5.05	4.26
USA	4.50	4.21	4.22	4.13	3.36	4.18	4.45	4.92	4.15
VEN	4.25	3.96	5.41	3.43	3.60	4.19	3.41	5.22	3.55

Panel C: Radar Graphs

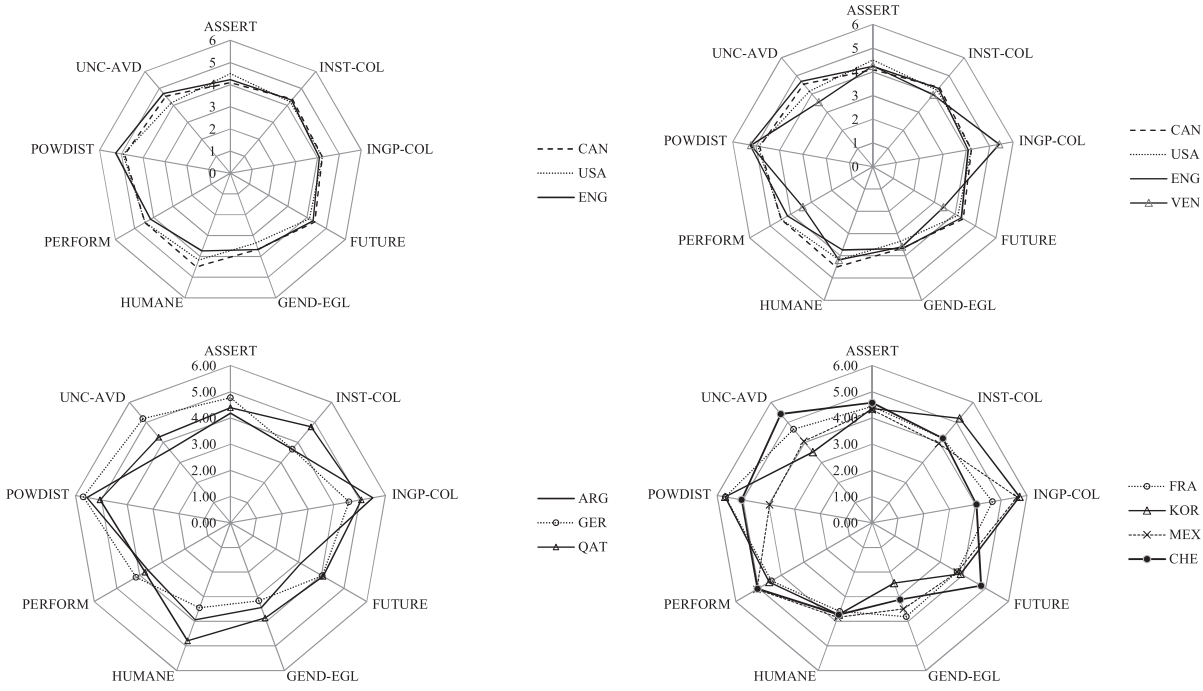

Figure 3. GLOBE dimension-based cultural distances, select country-pairs.

Similar to Figure 2, we again illustrate the need to analyse individual component effects on migration rather than composite measures. A sample of composite GLOBE cultural distances is presented in Panel A of Figure 3, while component cultural dimension scores are provided in Panel B. In Panel C, we again show various differences using graphs. The upper left graph depicts three countries (i.e. Canada, England, and the USA) that have similar scores across all component dimensions and, thus, which are similar cultural distances from one another. The upper right graph adds Venezuela, which is culturally different from all three both in terms of the component dimension scores and the composite GLOBE cultural distance measures.

The bottom two graphs include two groups of countries for which composite cultural distance values are similar. In both instances, however, the scores for the component cultural dimensions vary considerably. Looking to the composite cultural distance value, Argentina is nearly as culturally different from Germany as it is from Qatar. However, the component differences between the country pairs are quite dissimilar and such differences may influence migration in different ways. Similarly, France and South Korea are about as culturally distant as are Mexico and Switzerland. Once again, however, the component dimension scores vary considerably, which could influence migration between the country pairs in diverse ways.

IV. Estimation results

Estimation results are presented in Table 2 through 4. Since our dependent variable is in count form, we follow the lead of previous studies (i.e. Belot and Ederveen

(2012) and White (2013)) and employ the negative binomial technique. Further, depending on the measure of cultural distance employed, 10.04–10.22 percent of our dependent variable observations have zero values. Thus, following White and Yamasaki (2014), we conduct post-estimation Vuong tests and likelihood ratio tests to determine whether the zero-inflated negative binomial (ZINB) technique is preferable to the standard negative binomial technique and the zero-inflated Poisson technique. In all instances, the test statistics (presented in Table 2 through 4) confirm the appropriateness of the ZINB technique. All ZINB estimations produce both a standard negative binomial regression coefficient and a logit coefficient. The negative binomial coefficient indicates the expected change in the predicted number of migrants, while the logit coefficient is interpreted as the change in the log-odds of being an excessive zero.

Inglehart cultural distance and international migration

Beginning with the analysis of the Inglehart measure of cultural distance and the corresponding component dimensions, in column (a) of Table 2 we see a negative and statistically significant negative binomial coefficient on the Inglehart measure of cultural distance; however, the log-odds coefficient is not significantly different from zero. Thus, we can say that, all else equal, a source-destination country pair that is more culturally distant will have a lower level of migration between them as compared to a country pair that is more culturally-similar. For a one percent increase in the cultural distance between two given nations, we would expect the flow of immigrants from country i to country j to decrease by a factor of 0.8968 (i.e. a decrease of 10.32%).[11] Even

Table 2. Inglehart cultural distance.

	Neg. Bin.	Logit	Neg. Bin.	Logit
	(a)		(b)	
ln *Inglehart Cultural Distance*$_{ijt}$	−0.1089***	−0.0726		
	(0.0189)	(0.0799)		
ln | $SSE_{it} - SSE_{jt}$ |			−0.026**	−0.0601
			(0.0109)	(0.0484)
ln | $TSR_{it} - TSR_{jt}$ |			−0.0297***	0.0117
			(0.0094)	(0.0459)
ln *Relative GDP per capita*$_{ijt}$	−0.2176***	−0.2603***	−0.213***	−0.2555***
	(0.0687)	(0.0305)	(0.0688)	(0.0313)
ln *Geodesic Distance*$_{ij}$	−0.4275***	−0.5571***	−0.438***	−0.7029***
	(0.0183)	(0.0645)	(0.0185)	(0.0681)
ln (Population$_{it}$ × Population$_{jt}$)	−0.0316	0.7219***	−0.0321	0.7928***
	(0.1865)	(0.0364)	(0.1868)	(0.0386)
ln *Immigrant Stock*$_{ijt-1}$	0.6916***	−0.5887***	0.697***	−0.6348***
	(0.0074)	(0.0287)	(0.0074)	(0.03)
Colony$_{ij}$	0.2657***	0.4859**	0.2637***	0.5602***
	(0.0363)	(0.206)	(0.0364)	(0.2076)
Common Border$_{ij}$	−0.2353***	0.5919***	−0.2405***	0.4874***
	(0.0404)	(0.1892)	(0.0404)	(0.1896)
Unemployment Rate$_{jt}$ (Destination)	−0.0488***	−0.1245***	−0.049***	−0.1335***
	(0.0043)	(0.0147)	(0.0043)	(0.0149)
Unemployment Rate$_{it}$ (Source)	0.0157***	0.0234***	0.0146***	0.024***
	(0.0037)	(0.0087)	(0.0037)	(0.0089)
Constant	7.0812	−16.7815***	7.0843	−17.6476***
	(5.9471)	(0.9074)	(5.9544)	(0.9397)
ln alpha		−0.8317***		−0.8806***
		(0.0167)		(0.0159)
alpha		0.4353		0.4145
		(0.0073)		(0.0066)
Vuong test (ZINB vs. NB)	18.51***		18.29***	
LR test of alpha = 0 (ZINB vs. ZIP)	8.1E+06***		8.1E+06***	
N	8,993		8,993	
Immigrant flow = 0 (% Dep. Var. obs.)	903 (10.04%)		903 (10.04%)	
LR χ^2	21,306***		21,298***	
Log-likelihood	−60,554		−60,584	

Standard errors in parentheses. '***', '**', and '*' indicate significance from zero at the 1%, 5%, and 10% levels, respectively. All estimations include time, source country, and destination country fixed effects terms. Coefficients not reported here due to space constraints.

[11]The marginal effect on the predicted count of immigrants from country i to country j during year t is calculated as $\exp^{\hat{\beta}} \times 100$.

so, looking to the corresponding log-odds coefficient, it appears that greater cultural distance does not influence whether or not any migration occurs.

When we decompose the Inglehart measure of cultural distance into the two component dimensions, SSE and TSR, we find similar results. The negative binomial coefficients on the component dimension variables are both negative and significant from zero; however, the log-odds coefficients are again not significantly different from zero. One percent increases in the difference between the source and destination countries' SSE and TSR scores decrease the flow of immigrants by factors of 0.9743 and 0.9707, respectively (i.e. respective decreases of 2.57% and 2.93%). These results imply that the differences in SSE and TSR scores carry approximately equal influences on migration.

For both estimations, the signs of the coefficients for the traditional gravity model variables and the migration model variables are consistent with expectations and the majority of the estimates are statistically significant from zero. This is generally the case when the Hofstede and GLOBE cultural distance measures are examined (see Tables 3 and 4). Focusing on the results in Table 2, the estimated coefficients of the relative per capita GDP, the geodesic distance, the common border variable, and the unemployment rate of the destination country are all negative and statistically significant. The coefficients on the immigrant stock, the colony variable, and the source-country unemployment rate are all positive and significant. The coefficient of the population variable is negative in each estimation; however, it is not statistically significant.

Hofstede cultural distance and international migration

Results obtained while using the Hofstede measure of cultural distance are presented in Table 3. In column (a), we see a negative and statistically significant negative binomial coefficient on the Hofstede component measure of cultural distance, and the log-odds coefficient is positive and significantly different from zero. Thus, we can again say that, all else equal, a source-destination country pair that is more culturally distant will have a lower level of migration between them as compared to a country pair that is more culturally similar. However, as opposed to the Inglehart measure, when the Hofstede measure is used, greater cultural distance also implies a greater likelihood that no migration takes place. A 1% increase in a country pair's cultural distance decreases the immigrant flow between the countries by a factor of 0.8966 (i.e. 10.34%) while also increasing the log-odds of no migration occurring by 0.0903.

Examining the results in column (b) of Table 3 reveals the importance of decomposing the cultural distance measures to investigate the corresponding influences on migration. Of the six Hofstede components, only the coefficients of the source-destination country differences in IDV, MAS, and UAI are statistically significant from zero and negative. Differences in the IDV cultural dimension are the most influential on immigrant flows. A one percent increase in the difference in IDV, MAS, and UAI measures decreases the immigrant flow by factors of 0.8975, 0.9067, and 0.9606, respectively (i.e. by 10.25%, 9.33%, and 3.94%, respectively). These results demonstrate that these three components are most influential in the previously demonstrated cultural distance-migration link. Policies which reduce cross-country differences in these components are likely to promote migration from countries with similar cultural characteristics while inhibiting migration from countries where such opportunities are less common.

Differences in the PDI, PRA, and IND cultural dimensions are not found to have significant influences on immigrant flows. As for the influence of the differences in the components on the log-odds of migration occurring, differences in PDI appear to significantly increase the likelihood of no migration occurring. Curiously, while differences in MAS reduce migration, those differences also decrease the likelihood that no migration occurs.

International migration

Estimation of Equation (1) using the GLOBE measure of cultural distance yields results that are similar to those obtained when the Hofstede measure is used. Results obtained when considering the composite measure of cultural distance are presented in column (a) of Table 4, while results from the estimation which

Table 3. Hofstede cultural distance.

	Neg. Bin.	Logit	Neg. Bin.	Logit
	(a)		(b)	
ln *Hofstede Cultural Distance*$_{ij}$	−0.1092***	0.0903**		
	(0.011)	(0.0445)		
ln | *PDI*$_{it}$ − *PDI*$_{jt}$ |			0.0027	0.1571***
			(0.0096)	(0.0378)
ln | *IDV*$_{it}$ − *IDV*$_{jt}$ |			−0.1081***	0.0217
			(0.0095)	(0.0365)
ln | *MAS*$_{it}$ − *MAS*$_{jt}$ |			−0.0979***	−0.1061***
			(0.0071)	(0.0316)
ln | *UAI*$_{it}$ − *UAI*$_{jt}$ |			−0.0402***	0.0282
			(0.0066)	(0.0305)
ln | *PRA*$_{it}$ − *PRA*$_{jt}$ |			−0.0035	−0.0173
			(0.0066)	(0.0304)
ln | *IND*$_{t}$ − *IND*$_{jt}$ |			0.0044	0.0488
			(0.0074)	(0.0319)
ln *Relative GDP per capita*$_{ijt}$	−0.294***	−0.2531***	−0.2786***	−0.2785***
	(0.0523)	(0.0216)	(0.0524)	(0.0228)
ln *Geodesic Distance*$_{ij}$	−0.4641***	−0.1169***	−0.417***	−0.1077***
	(0.0129)	(0.0384)	(0.0131)	(0.0399)
ln (*Population*$_{it}$ × *Population*$_{jt}$)	−0.0349	0.3475***	−0.0277	0.3063***
	(0.1016)	(0.021)	(0.1015)	(0.0208)
ln *Immigrant Stock*$_{ijt-1}$	0.7207***	−0.3311***	0.6825***	−0.3218***
	(0.0056)	(0.0179)	(0.0056)	(0.0181)
Colony$_{ij}$	0.3099***	0.1517	0.2944***	0.1519
	(0.03)	(0.1497)	(0.0304)	(0.1503)
Common Border$_{ij}$	−0.3181***	0.6256***	−0.2128***	0.5479***
	(0.0312)	(0.1377)	(0.031)	(0.1388)
Unemployment Rate$_{jt}$ (Destination)	−0.049***	0.0431***	−0.053***	0.0424***
	(0.0032)	(0.0074)	(0.0032)	(0.0073)
Unemployment Rate$_{it}$ (Source)	0.0282***	0.0229***	0.0231***	0.0191***
	(0.0027)	(0.0062)	(0.0027)	(0.0063)
Constant	6.7641**	−10.6759***	6.9989**	−9.6892***
	(3.384)	(0.5723)	(3.3764)	(0.6052)
ln alpha		−0.8328***		−0.8316***
		(0.0118)		(0.0119)
Alpha		0.4349		0.4354
		(0.0051)		(0.0052)
Vuong test (ZINB vs. NB)	22.50***		22.17***	
LR test of alpha = 0 (ZINB vs. ZIP)	1.3E+07***		1.2E+07***	
N	16,513		16,513	
Immigrant flow = 0 (% Dep. Var. obs.)	1681 (10.18%)		1681 (10.18%)	
LR χ^2	37,752***		37,770***	
Log-likelihood	−106,144		106,123	

See Table 2 notes.

uses the individual dimensions are presented in column (b). As expected, for the negative binomial estimation, we observe a negative and statistically significant coefficient for the composite cultural distance measure. A one percent increase in the cultural distance measure decreases the immigrant flow by a factor of 0.8909 (i.e. 10.91%). However, the log-odds of no migration taking place decreases when the same one percent increase in the composite measure of cultural distance is considered.

As with the Hofstede measure, to accurately examine the influences on migration, the results presented in column (b) of Table 4 demonstrate the need for the decomposition of the composite measure of cultural distance. Of the nine dimensions of the GLOBE cultural distance, differences in five dimensions (i.e. ASSERT, INST-COL, INGP-COL, HUMANE, and UNC-AVD) correspond to negative and statistically significant impacts on migration. One of the nine dimensions (GEND-EGL) demonstrates a positive and significant impact on international migration, while the coefficient estimates of the remaining three dimensions are not significantly different from zero. Differences in the INGP-COL dimension are most influential on migration flows, and one percent increases in the differences between values of INGP-COL, UNC-AVD, and HUMANE correspond with decreases in the immigrant flow by factors of 0.947, 0.9657, and 0.973 (i.e. 5.53%, 3.43%, and 2.7%), respectively. A one percent increase in the difference in GEND-EGL values

Table 4. GLOBE cultural distance.

	Neg. Bin.	Logit	Neg. Bin.	Logit
	(a)		(b)	
ln *GLOBE Cultural Distance*$_{ij}$	−0.118***	−0.4898**		
	(0.0284)	(0.2307)		
ln | *ASSERT*$_i$ − *ASSERT*$_j$ |			−0.0189**	−0.1123***
			(0.0086)	(0.0354)
ln | *INST-COL*$_i$ − *INST-COL*$_j$ |			−0.019**	−0.1211***
			(0.0095)	(0.0393)
ln | *INGP-COL*$_i$ − *INGP-COL*$_j$ |			−0.0545***	0.0456
			(0.0097)	(0.0397)
ln | *FUTURE*$_i$ − *FUTURE*$_j$ |			0.0117	−0.148***
			(0.0099)	(0.0387)
ln | *GEND-EGL*$_i$ − *GEND-EGL*$_j$ |			0.0491***	−0.0738**
			(0.0086)	(0.0362)
ln | *HUMANE*$_i$ − *HUMANE*$_j$ |			−0.0274***	0.0256
			(0.0094)	(0.0399)
ln | *PERFORM*$_i$ − *PERFORM*$_j$ |			0.0051	0.1697***
			(0.0079)	(0.0398)
ln | *POWDIST*$_i$ − *POWDIST*$_j$ |			0.0078	−0.1135***
			(0.0093)	(0.0364)
ln | *UNC-AVD*$_i$ − *UNC-AVD*$_j$ |			−0.0349***	0.0595
			(0.0093)	(0.0418)
ln *Relative GDP per capita*$_{ijt}$	−0.3529***	1.4253**	0.1432**	−0.1805***
	(0.0658)	(0.5819)	(0.0641)	(0.0292)
ln *Geodesic Distance*$_{ij}$	−0.4753***	0.0188	−0.4053***	−0.1464***
	(0.0157)	(0.1461)	(0.0159)	(0.0456)
ln (*Population*$_{it}$ × *Population*$_{jt}$)	−0.0341	−4.0812***	−0.3657***	0.1052***
	(0.1184)	(0.897)	(0.1192)	(0.0277)
ln *Immigrant Stock*$_{ijt-1}$	0.6985***	−0.4885***	0.7328***	−0.2619***
	(0.0074)	(0.0614)	(0.0073)	(0.0232)
Colony$_{ij}$	0.5326***	−0.8146***	0.4013***	−0.1202
	(0.0365)	(0.3156)	(0.0374)	(0.1885)
Common Border$_{ij}$	−0.3705***	1.3126***	−0.3422***	0.4041**
	(0.0397)	(0.3151)	(0.0405)	(0.1761)
Unemployment Rate$_{jt}$ (Destination)	−0.035***	0.1558***	−0.0301***	0.0245**
	(0.004)	(0.057)	(0.004)	(0.0097)
Unemployment Rate$_{it}$ (Source)	0.0206***	−0.0768***	0.0184***	−0.0139
	(0.0034)	(0.0284)	(0.0034)	(0.009)
Constant	7.0287*	117.31***	13.8154***	−2.6881***
	(3.7289)	(28.4994)	(3.7355)	(0.7938)
ln alpha		−0.8829***		−0.9081***
		(0.0151)		(0.015)
Alpha		0.4136		0.4033
		(0.0063)		(0.006)
Vuong test (ZINB vs. NB)		27.59***		19.64***
LR test of alpha = 0 (ZINB vs. ZIP)		1.0E+07***		9.3E+06***
N		9,489		9,489
Immigrant flow = 0 (% Dep. Var. obs.)		970 (10.22%)		970 (10.22%)
LR χ^2		22,165***		21,818***
Log-likelihood		−63,263		−64,837

See Table 2 notes.

increases the immigrant flow by a factor of 1.0503 (i.e. an increase of 5.03%).

As with the results using the Hofstede components, these results allow for a more detailed understanding of the characteristics driving the previously-identified link between cultural differences and migration. Components of cultural distance that include the individual's opportunity for success, gender roles, and uncertainty avoidance are the most influential underlying components within the relationship between cultural distance and migration. Given these results, any policies which change a country's scores among these components will have the greatest effects on where its citizens are most likely to migrate to or from.

While the positive relationship between immigrant flows and differences along the Gender Egalitarianism dimension, which is also closely related to the Masculinity dimension, may appear odd, a reasonable explanation can be made. The Masculinity dimension, as well as the Assertiveness dimension, relates gender and attitudes towards roles in society and quality of life. Gender Egalitarianism can be seen as tolerance of gender

inequality, particularly with regard to opportunities for women. In that case, one can see that greater differences in a country's tolerance of gender equality might actually spur more migration, and this result provides a strong illustration of the need for this type of analysis at the component-level of cultural differences.

The effects of increases in differences in INST-COL and ASSERT are nearly equal, with one percent increases decreasing immigrant flows by factors of 0.9812 (1.88%) and 0.9813 (1.87%), respectively. The results of the logit estimation indicate that only an increase in the difference of the PERFORM cultural dimension results in a significant increase in the likelihood that no migration occurs. Increased differences in FUTURE, INST-COL, POWDIST, ASSERT, and GEND-EGL all result in a decreased likelihood of no migration occurring.

V. Conclusions and implications

We use the zero-inflated negative binomial regression technique and a modified gravity model to examine the influences of traditional migration variables and three separate composite measures of cultural distance on international migration flows. Employing annual data for large, heterogeneous sets of 102 immigrant source countries and 36 destination countries during the 1982-2GL013 period, we have confirmed the negative relationship between cultural differences and international migration that has been documented by prior studies. More specifically, in response to one percent increases in the Inglehart, Hofstede, and GLOBE composite measures of cultural distance, international migration flows are estimated to decrease by factors of 0.8968, 0.8966, and 0.8909, respectively (i.e. 10.32%, 10.34%, and 10.91%, respectively).

Extending the literature, we have decomposed each of the composite measures of cultural distance into their component dimensions to examine the cultural distance–migration relationship in greater detail. Results obtained from the estimation of a series of regression models in which the 2-dimension Inglehart, 6-dimension Hofstede, and 9-dimension GLOBE composite measures of cultural distance have been replaced by their respective component cultural dimensions indicate variability across the dimensions of cultural differences in terms of the relationship between these dimensions of cultural distance and migration flows. The observed variability highlights that country pairs with similar composite cultural distance values may not show the same expected migration, all else equal.

Looking to the component dimensions of the Inglehart measure, we see that greater differences along the TSR dimension are slightly more influential than differences along the SSE dimension, though both are negative and statistically significant from zero. When considering the component dimensions of the Hofstede measure, we see significant migration-inhibiting influences of differences along the individualism (IDV), masculinity (MAS) and uncertainty avoidance (UAI) dimensions. Similarly, when considering the dimensions of the GLOBE measure, listed in order of magnitude, we find difference in the In-group Collectivism (INGP-COL), Uncertainty Avoidance (UNC-AVD), Humane Orientation (HUMANE), Institutional Collectivism (INST-COL), and Assertiveness (ASSERT) dimensions are all negatively related with international migration and statistically significant from zero. Greater differences along the gender egalitarianism (GEND-EGL) dimension are found to be positively related to international migration.

Our findings have important implications when one considers how both immigration policies and domestic policies may shape migration. The IDV and INGP-COL dimensions in the Hofstede and GLOBE measures, respectively, are the most influential with respect to migration flows. Within the broader composite measures, these components embody an individual's ability to pursue goals related to improvement of one's status and the well-being of the immediate family. Any policy that directly or indirectly changes the IDV or INGP-COL score will have the most influential effect on migration between country pairs. As the component dimension values increase (decrease), we expect corresponding increases in migration to/from countries with higher (lower) IDV or INGP-COL values while simultaneously seeing decreases in migration to/from countries with lower (higher) IDV or INGP-COL values.

Extending this idea towards immigration policy, assimilation policies which enhance opportunities for employment, advancement, and entrepreneurial activity would appear to have the greatest impact on migration flows. An additional finding is that differences in gender roles within a society strongly

influence international migration flows. While our data do not allow for separate examination of men and women, we can infer that the role of women in a society is a major factor in this result. Finally, greater differences in uncertainty avoidance inhibit migration between the countries. Policies that affect this component will likely shift the countries from/to where migration occurs as more migration occurs from/to countries with similar levels of conservatism.

While our results confirm the findings or prior research on the relationship between cross-societal cultural differences and international migration, we extend the related literature by affording a more detailed and, thus, more complete understanding of the influences of cultural differences on international migration. The implications of a negative influence of cultural distance on migration are likely far-reaching, and the resulting more detailed understanding of the relationship may benefit the formulation of immigration policy.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix. Country listing (with ISO3 codes in parentheses)[12]

Source countries

Albania (ALB), Algeria[a] (DZA), Angola[b] (AGO), Argentina (ARG), Armenia[a] (ARM), Australia (AUS), Austria (AUT), Azerbaijan[a] (AZE), Bangladesh[a,b] (BGD), Belarus[a] (BLR), Belgium[a,b] (BEL), Bolivia[c] (BOL), Bosnia and Herzegovina[a] (BIH), Brazil (BRA), Bulgaria[a,b] (BGR), Burkina Faso[a,b] (BFA), Canada (CAN), Cape Verde[b] (CPV), Chile[a,b] (CHL), China (CHN), Colombia (COL), Costa Rica[c] (CRI), Croatia[a,b] (HRV), Cyprus[a] (CYP), Czech Republic[a,b] (CZE), Denmark (DNK), Dominican Republic[a,b] (DOM), Ecuador[c] (ECU), Egypt (EGY), El Salvador (SLV), Estonia[a,b] (EST), Ethiopia[a] (ETH), Finland (FIN), France (FRA), Georgia[a,c] (GEO), Germany (DEU), Ghana[a,b] (GHA), Greece (GRC), Guatemala[a,c] (GTM), Hong Kong (HKG), Hungary (HUN), Iceland[a,b] (ISL), India (IND), Indonesia (IDN), Iran[a,b] (IRN), Iraq[a,b] (IRQ), Ireland (IRL), Israel[a,c] (ISR), Italy (ITA), Japan (JPN), Jordan[a,b] (JOR), Kazakhstan[c] (KAZ), Korea, Rep. of (KOR), Kuwait[c] (KWT), Kyrgyz Republic[a] (KGZ), Latvia[a,b] (LVA), Lebanon[b] (LBN), Libya[b] (LBY), Lithuania[a,b] (LTU), Luxembourg[a,b] (LUX), Macedonia, FYR[a] (MKD), Malaysia (MYS), Mali[a] (MLI), Malta[a,b] (MLT), Mexico (MEX), Moldova[a] (MDA), Morocco (MAR), Mozambique[b] (MOZ), Namibia[c] (NAM) Netherlands (NLD), New Zealand (NZL), Nigeria (NGA), Norway[a,b] (NOR), Pakistan[a,b] (PAK), Peru[a,b] (PER), Philippines (PHL), Poland (POL), Portugal (PRT), Puerto Rico[a] (PRI), Qatar[c] (QAT), Russian Federation (RUS), Rwanda[a] (RWA), Saudi Arabia[a,b] (SAU), Singapore (SGP), Slovak Republic (SVK), Slovenia[a,b] (SVN), South Africa[a,b] (ZAF), Spain (ESP), Sweden (SWE), Switzerland (CHE), Tanzania[a,b] (TZA), Thailand (THA), Trinidad and Tobago[a,b] (TTO), Turkey (TUR), Ukraine[a] (UKR), United Kingdom (GBR), United States (USA), Uruguay[a,b] (URY), Venezuela (VEN), Vietnam[a,b] (VNM), Zambia (ZMB), Zimbabwe[a,c] (ZWE).

Destination countries

Australia (AUS), Austria (AUT), Belgium[a,b] (BEL), Canada (CAN), Chile[a,b] (CHL), Czech Republic[a,b] (CZE), Denmark (DNK), Finland (FIN), France (FRA), Germany (DEU), Greece (GRC), Hungary (HUN), Iceland[a,b] (ISL), Ireland (IRL), Israel[a,c] (ISR), Italy (ITA), Japan (JPN), Korea, Rep. of (KOR), Latvia[a,b] (LVA), Lithuania[a,b] (LTU), Luxembourg[a,b] (LUX), Mexico (MEX), Netherlands (NLD), New Zealand (NZL), Norway[a,b] (NOR), Poland (POL), Portugal (PRT), Russian Federation (RUS), Slovak Republic (SVK), Slovenia[a,b] (SVN), Spain (ESP), Sweden (SWE), Switzerland (CHE), Turkey (TUR), United Kingdom (GBR), United States (USA).

[12]The absence of superscripts on the name of a country indicates that data are available for all estimations regardless of the measure of cultural distance employed. The superscripts *a*, *b*, and *c* indicates that, for the corresponding country, data available for the estimations that employ the Inglehart, Hofstede, and GLOBE measures of cultural distance measure, respectively.

Appendix A1. Inglehart cultural dimensions, waves 1 through 5.

	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5	
	1981–1984		1990–1994		1995–1998		1999–2004		2005–2009	
Country	TSR	SSE	TSR	SSE	TSR	SSE	TSR	SSE	TSR	SSE
Albania	.	.	.	.	0.52	−1.56	0.07	−1.14	.	.
Algeria	.	.	.	.	.	.	−1.48	−0.74	.	.
Andorra	.	.	.	.	.	.	.	.	0.8	1.62
Argentina	0	−0.3	−0.46	0.03	−0.6	0.71	−0.95	0.36	−0.66	0.38
Armenia	.	.	.	.	0.55	−1.31	.	.	.	.
Australia	−0.34	1.14	.	.	−0.18	1.96	.	.	0.21	1.75
Austria	.	.	0.23	0.8	.	.	0.25	1.43	.	.
Azerbaijan	.	.	.	.	−0.14	−1.38	.	.	.	.
Bangladesh	.	.	.	.	−1.24	−1.1	−1.21	−0.93	.	.
Belarus	.	.	0.93	−1.12	0.67	−1.72	0.89	−1.23	.	.
Belgium	0.09	0.08	0.4	0.77	.	.	0.5	1.13	.	.
Bosnia	.	.	.	.	0.09	−0.56	0.34	−0.65	.	.
Brazil	.	.	−0.95	−0.38	−1.29	0.02	.	.	−0.98	0.61
Bulgaria	.	.	1.28	−1.33	0.9	−1.23	1.15	−1.52	1.13	−1.01
Burkina Faso	.	.	.	.	.	.	.	.	−1.32	−0.49
Canada	−0.52	1.04	0.07	1.31	.	.	−0.16	1.72	−0.26	1.91
Chile	.	.	−1.1	−0.2	−0.81	−0.08	−0.87	0.12	−0.87	0
China	.	.	1.79	−1.13	0.79	−1.23	1.2	−0.93	0.8	−1.16
Colombia	.	.	.	.	−1.71	0.34	−1.67	0.68	−1.87	0.6
Croatia	.	.	.	.	0.72	−0.51	0.08	0.31	.	.
Cyprus	.	.	.	.	.	.	.	.	−0.56	0.13
Czech Rep.	.	.	1.24	−0.11	1.07	0.33	1.23	0.38	.	.
Denmark	1.6	1.44	1.25	1.2	.	.	1.16	1.87	.	.
Dominican Rep.	.	.	.	.	−1.05	0.33	.	.	.	.
Egypt	.	.	.	.	.	.	−1.61	−0.46	.	.
El Salvador	.	.	.	.	.	.	−2.06	0.53	.	.
Estonia	.	.	1.3	−0.88	1.27	−1.3	1.27	−1.19	.	.
Ethiopia	.	.	.	.	.	.	.	.	−0.65	−0.36
Finland	0.63	0.82	1.21	1.26	0.68	1.01	0.84	0.94	0.82	1.12
France	0.54	0.13	0.38	0.71	.	.	0.52	0.94	0.63	1.13
Georgia	.	.	.	.	−0.04	−1.31	.	.	.	.
Germany	0.83	−0.07	1.23	0.69	1.55	1.52	1.17	0.44	1.31	0.74
	Wave 1		*Wave 2*		*Wave 3*		*Wave 4*		*Wave 5*	
	1981–1984		1990–1994		1995–1998		1999–2004		2005–2009	
Country	TSR	SSE	TSR	SSE	TSR	SSE	TSR	SSE	TSR	SSE
Pakistan	.	.	.	.	−1.39	−0.52	−1.42	−1.25	.	.
Peru	.	.	.	.	−1.26	−0.18	−1.36	0.03	.	.
Philippines	.	.	.	.	−1.38	−0.12	−1.21	−0.11	.	.
Poland	.	.	−0.81	−0.27	−0.47	−0.41	−0.43	−0.6	−0.78	−0.14
Portugal	.	.	−0.21	−0.43	.	.	−0.9	0.49	.	.
Romania	.	.	0.24	−1.18	0.36	−1.26	−0.28	−1.6	−0.39	−1.55
Russia	.	.	1.09	−1.34	0.87	−1.85	1.09	−1.88	0.49	−1.42
Rwanda	.	.	.	.	.	.	.	.	−1.57	−0.62
Saudi Arabia	.	.	.	.	.	.	−1.31	0.15	.	.
Serbia	.	.	.	.	0.84	−1.05	0.65	−1.03	0.35	−0.62
Singapore	.	.	.	.	.	.	−0.54	−0.28	.	.
Slovakia	.	.	0.75	−0.82	0.41	−0.27	0.67	−0.43	.	.

	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5	
	1981–1984		1990–1994		1995–1998		1999–2004		2005–2009	
Country	TSR	SSE	TSR	SSE	TSR	SSE	TSR	SSE	TSR	SSE
Ghana	.	.	.	.	−1.66	−0.05	.	.	−1.94	−0.29
Greece	.	.	.	.	.	.	0.77	0.55	.	.
Guatemala	.	.	.	.	.	.	−1.7	−0.17	.	.
Hong Kong	.	.	.	.	.	.	.	.	1.2	−0.98
Hungary	0.17	−1.07	0.46	−1.06	0.79	−0.77	0.4	−1.22	.	.
Iceland	0.01	0.83	0.27	1.12	.	.	0.44	1.63	.	.
India	.	.	−0.49	−0.91	−0.54	−0.69	−0.52	−0.6	−0.36	−0.21
Indonesia	.	.	.	.	.	.	−1.07	−0.5	−0.47	−0.8
Iran	.	.	.	.	−1.4	−0.34	−1.22	−0.45	.	.
Iraq	.	.	.	.	.	.	.	.	−0.4	−1.68
Ireland	−0.92	0.59	−1.1	1	.	.	−0.91	1.18	.	.
Israel	.	.	.	.	.	.	0.26	0.36	.	.
Italy	0.18	−0.6	0.11	0.53	.	.	0.19	0.85	0.13	0.6
Japan	1.41	−0.41	1.62	−0.12	1.79	0.37	1.91	0.54	1.96	−0.05
Jordan	.	.	.	.	−1.46	−0.97	−1.61	−1.05	.	.
Korea, Rep.	1.08	−0.74	1.11	−0.65	0.96	−0.64	1.13	−0.55	0.61	−1.37
Kyrgyz Rep.	.	.	.	.	.	.	−0.15	−0.91	.	.
Latvia	.	.	1.21	−0.6	1.33	−0.89	0.72	−1.27	.	.
Lithuania	.	.	0.68	−0.64	0.96	−1.45	0.98	−1	.	.
Luxembourg	.	.	.	.	.	.	0.42	1.13	.	.
Macedonia	.	.	.	.	0.31	−1.02	0.12	−0.72	.	.
Malaysia	.	.	.	.	.	.	.	.	−0.73	0.09
Mali	.	.	.	.	.	.	.	.	−1.25	−0.08
Malta	.	.	.	.	.	.	−1.53	−0.03	.	.
Mexico	−1.15	−0.26	−0.3	0.09	−0.81	0.3	−1.47	0.53	−1.47	1.03
Moldova	.	.	.	.	0.36	−1.91	0.46	−1.69	0.47	−1.28
Montenegro	.	.	.	.	0.58	−1.12	0.86	−1.24	.	.
Morocco	.	.	.	.	.	.	−1.64	−1.09	−1.32	−1.04
Netherlands	0.73	0.9	0.77	1.99	.	.	0.84	1.94	0.71	1.39
New Zealand	.	.	.	.	0.2	1.78	.	.	0	1.86
Nigeria	.	.	−1.62	−0.68	−1.58	−0.68	−1.53	0.28	.	.
Norway	0.89	0.53	1.17	0.79	1.31	1.33	.	.	1.39	2.17

(*Continued*)

Appendix A1. (Continued).

	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5	
	1981–1984		1990–1994		1995–1998		1999–2004		2005–2009	
Country	TSR	SSE	TSR	SSE	TSR	SSE	TSR	SSE	TSR	SSE
Slovenia	.	.	0.64	−0.62	0.69	−0.04	0.95	0.38	0.73	0.36
South Africa	−0.53	−0.4	−0.92	−0.46	−1.26	−0.46	−1.12	−0.1	−1.09	−0.1
Spain	−0.26	−0.52	−0.06	0.2	−0.37	0.47	0.12	0.51	0.09	0.54
Sweden	1.2	0.85	1.17	1.54	1.49	1.99	1.67	2.09	1.86	2.35
Switzerland	.	.	0.19	1.11	0.82	1.35	.	.	0.74	1.9
Taiwan	.	.	.	.	0.66	−0.81	.	.	1.16	−1.18
Tanzania	.	.	.	.	.	.	−1.84	−0.15	.	.
Thailand	.	.	.	.	.	.	.	.	−0.64	0.01
Trin. & Tob.	.	.	.	.	.	.	.	.	−1.83	−0.26
Turkey	.	.	−0.89	−0.17	−1.13	0.28	−0.86	−0.34	−0.89	−0.33
Uganda	−1.42	−0.5	.	.	.	.	.	.	.	.
Ukraine	.	.	.	.	0.84	−1.83	0.9	−1.72	0.3	−0.83
United Kingdom	−0.25	0.95	0.08	1.13	0.08	1.24	0.29	1.31	0.06	1.68
United States	−0.83	0.68	−0.68	1.35	−0.89	1.62	−0.52	1.59	−0.81	1.76
Uruguay	.	.	.	.	−0.21	0.48	.	.	−0.37	0.99
Venezuela	.	.	.	.	−1.82	0.35	−1.6	0.43	.	.
Vietnam	.	.	.	.	.	.	−0.68	0.22	−0.3	−0.26
Zambia	.	.	.	.	.	.	.	.	−0.77	−0.62
Zimbabwe	.	.	.	.	.	.	−1.5	−1.36	.	.

	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5	
	1981–1984		1990–1994		1995–1998		1999–2004		2005–2009	
Country	TSR	SSE	TSR	SSE	TSR	SSE	TSR	SSE	TSR	SSE

Appendix A2. Hofstede cultural dimensions.

Country	ISO3	Power distance index	Individualism vs. collectivism	Masculinity vs. femininity	Uncertainty avoidance index	Pragmatic vs. normative	Indulgence vs. restraint	Country	ISO3	Power distance index	Individualism vs. collectivism	Masculinity vs. femininity	Uncertainty avoidance index	Pragmatic vs. normative	Indulgence vs. restraint
Albania	ALB	90	20	80	70	61	15	Hong Kong	HKG	68	25	57	29	61	17
Angola	AGO	83	18	20	60	15	83	Hungary	HUN	46	80	88	82	58	31
Argentina	ARG	49	46	56	86	20	62	Iceland	ISL	30	60	10	50	28	67
Australia	AUS	36	90	61	51	21	71	India	IND	77	48	56	40	51	26
Austria	AUT	11	55	79	70	60	63	Indonesia	IDN	78	14	46	48	62	38
Bangladesh	BGD	80	20	55	60	47	20	Iran	IRN	58	41	43	59	14	40
Belgium	BEL	65	75	54	94	82	57	Iraq	IRQ	95	30	70	85	25	17
Brazil	BRA	69	38	49	76	44	59	Ireland	IRL	28	70	68	35	24	65
Bulgaria	BGR	70	30	40	85	69	16	Italy	ITA	50	76	70	75	61	30
Burkina Faso	BFA	70	15	50	55	27	18	Japan	JPN	54	46	95	92	88	42
Canada	CAN	39	80	52	48	36	68	Jordan	JOR	70	30	45	65	16	43
Cape Verde	CPV	75	20	15	40	12	83	Korea, Rep. of	KOR	60	18	39	85	100	29
Chile	CHL	63	23	28	86	31	68	Latvia	LVA	44	70	9	63	69	13
China	CHN	80	20	66	30	87	24	Lebanon	LBN	75	40	65	50	14	25
Colombia	COL	67	13	64	80	13	83	Libya	LBY	80	38	52	68	23	34
Croatia	HRV	73	33	40	80	58	33	Lithuania	LTU	42	60	19	65	82	16
Czech Rep.	CZE	57	58	57	74	70	29	Luxembourg	LUX	40	60	50	70	64	56
Denmark	DNK	18	74	16	23	35	70	Malaysia	MYS	100	26	50	36	41	57
Dominican Rep.	DOM	65	30	65	45	13	54	Malta	MLT	56	59	47	96	47	66
Egypt	EGY	70	25	45	80	7	4	Mexico	MEX	81	30	69	82	24	97
El Savaldor	SLV	66	19	40	94	20	89	Morocco	MAR	70	46	53	68	14	25
Estonia	EST	40	60	30	60	82	16	Mozambique	MOZ	85	15	38	44	11	80
Finland	FIN	33	63	26	59	38	57	Netherlands	NLD	38	80	14	53	67	68
France	FRA	68	71	43	86	63	48	New Zealand	NZL	22	79	58	49	33	75
Germany	DEU	35	67	66	65	83	40	Nigeria	NGA	80	30	60	55	13	84
Ghana	GHA	80	15	40	65	4	72	Norway	NOR	31	69	8	50	35	55
Greece	GRC	60	35	57	100	45	50	Pakistan	PAK	55	14	50	70	50	0

		Power Distance Index	Individualism vs. Collectivism	Masculinity vs. Femininity	Uncertainty Avoidance Index	Pragmatic vs. Normative	Indulgence vs. Restraint
Country	ISO3	PDI	IDV	MAS	UAI	PRA	IND
Peru	PER	64	16	42	87	25	46
Philippines	PHL	94	32	64	44	27	42
Poland	POL	68	60	64	93	38	29
Portugal	PRT	63	27	31	99	28	33
Romania	ROM	90	30	42	90	52	20
Russia	RUS	93	39	36	95	81	20
Saudi Arabia	SAU	95	25	60	80	36	52
Serbia	SRB	86	25	43	92	52	28
Singapore	SGP	74	20	48	8	72	46
Slovakia	SVK	100	52	100	51	77	28
Slovenia	SVN	71	27	19	88	49	48
South Africa	ZAF	49	65	63	49	34	63
Spain	ESP	57	51	42	86	48	44
Sweden	SWE	31	71	5	29	53	78
Switzerland	CHE	34	68	70	58	74	66
Taiwan	TWN	58	17	45	69	93	49
Tanzania	TZA	70	25	40	50	34	38
Thailand	THA	64	20	34	64	32	45
Trin. & Tob.	TTO	47	16	58	55	13	80
Turkey	TUR	66	37	45	85	46	49
United Kingdom	GBR	35	89	66	35	51	69
United States	USA	40	91	62	46	26	68
Uruguay	URY	61	36	38	99	26	53
Venezuela	VEN	81	12	73	76	16	100
Vietnam	VNM	70	20	40	30	57	35
Zambia	ZMB	60	35	40	50	30	42
	Group Average	61.8	42.2	48.7	64.9	43.6	47.7
	Variance	415.8	521.3	382.9	445.6	576.6	535.3

Appendix A3. GLOBE cultural dimensions.

Country	Assertiveness (ASSERT)	Institutional collectivism (INST-COL)	In-Group collectivism (INGP-COL)	Future orientation (FUTURE)	Gender egalitarianism (GEND-EGL)	Humane orientation (HUMANE)	Performance orientation (PERFORM)	Power distance (POWDIST)	Uncertainty avoidance (UNC-AVD)
Albania	4.57	4.28	5.51	3.69	3.48	4.40	4.57	4.44	4.45
Argentina	4.18	3.66	5.51	3.10	3.44	3.94	3.63	5.56	3.63
Australia	4.29	4.31	4.14	4.09	3.41	4.32	4.37	4.81	4.40
Austria	4.59	4.34	4.89	4.47	3.18	3.77	4.47	5.00	5.10
Bolivia	3.78	3.96	5.44	3.55	3.45	3.99	3.57	4.46	3.32
Brazil	4.25	3.94	5.16	3.90	3.44	3.76	4.11	5.24	3.74
Canada	4.09	4.36	4.22	4.40	3.66	4.51	4.46	4.85	4.54
China	3.77	4.67	5.86	3.68	3.03	4.29	4.37	5.02	4.81
Colombia	4.16	3.84	5.59	3.35	3.64	3.72	3.93	5.37	3.62
Costa Rica	3.83	3.95	5.26	3.64	3.56	4.38	4.10	4.70	3.84
Denmark	4.04	4.93	3.63	4.59	4.02	4.67	4.40	4.14	5.32
Ecuador	3.98	3.82	5.55	3.66	3.09	4.45	4.06	5.29	3.63
Egypt	3.91	4.36	5.49	3.80	2.90	4.60	4.15	4.76	3.97
El Salvador	4.49	3.74	5.22	3.73	3.23	3.69	3.72	5.56	3.69
England	4.23	4.31	4.08	4.31	3.67	3.74	4.16	5.26	4.70
Finland	4.05	4.77	4.23	4.39	3.55	4.19	4.02	5.08	5.11
France	4.44	4.20	4.66	3.74	3.81	3.60	4.43	5.68	4.66
Georgia	4.15	4.03	6.18	3.45	3.52	4.17	3.85	5.15	3.54
Germany	4.77	3.67	4.59	4.04	3.17	3.45	4.16	5.70	5.19
Greece	4.55	3.41	5.28	3.53	3.53	3.44	3.34	5.35	3.52
Guatemala	3.96	3.78	5.54	3.35	3.14	3.91	3.85	5.47	3.44
Hong Kong	4.53	4.03	5.33	3.88	3.26	3.72	4.69	4.94	4.17
Hungary	4.71	3.63	5.31	3.31	4.02	3.39	3.50	5.57	3.26
India	3.70	4.25	5.81	4.04	2.89	4.45	4.11	5.29	4.02
Indonesia	3.70	4.27	5.50	3.61	3.04	4.47	4.14	4.93	3.92
Ireland	3.93	4.57	5.12	3.93	3.19	4.96	4.30	5.13	4.25
Israel	4.19	4.40	4.63	3.82	3.21	4.07	4.03	4.71	3.97
Italy	4.12	3.75	4.99	3.34	3.30	3.66	3.66	5.45	3.85
Japan	3.69	5.23	4.72	4.29	3.17	4.34	4.22	5.23	4.07
Kazakhstan	4.51	4.38	5.50	3.72	3.87	4.44	3.72	5.40	3.76
Korea (South)	4.36	5.20	5.71	3.90	2.45	3.73	4.53	5.69	3.52
Kuwait	3.56	4.32	5.70	3.18	2.59	4.44	3.79	4.97	4.02
Malaysia	3.77	4.45	5.47	4.39	3.31	4.76	4.16	5.09	4.59
Mexico	4.31	3.95	5.62	3.75	3.50	3.84	3.97	5.07	4.06
Morocco	4.72	4.18	6.37	3.50	3.08	4.52	4.31	6.14	3.95
Namibia	3.81	4.02	4.39	3.32	3.69	3.83	3.52	5.29	4.09
Netherlands	4.46	4.62	3.79	4.72	3.62	4.02	4.46	4.32	4.81
New Zealand	3.47	4.96	3.58	3.46	3.18	4.43	4.86	5.12	4.86
	ASSERT	INST-COL	INGP-COL	FUTURE	GEND-EGL	HUMANE	PERFORM	POWDIST	UNC-AVD
Nigeria	4.53	4.00	5.34	3.95	3.04	3.96	3.79	5.32	4.14
Philippines	3.85	4.37	6.14	3.92	3.42	4.88	4.21	5.15	3.69
Poland	4.11	4.51	5.55	3.23	3.94	3.67	3.96	5.09	3.71
Portugal	3.75	4.02	5.64	3.77	3.69	3.96	3.65	5.50	3.96
Qatar	4.39	4.78	5.07	4.08	3.86	4.79	3.76	5.05	4.26
Russia	3.86	4.57	5.83	3.06	4.07	4.04	3.53	5.61	3.09
Singapore	4.06	4.77	5.66	4.88	3.52	3.29	4.81	4.92	5.16
Slovenia	4.01	4.09	5.49	3.56	3.84	3.75	3.62	5.32	3.76
Spain	4.39	3.87	5.53	3.52	3.06	3.29	4.00	5.53	3.95
Sweden	3.41	5.26	3.46	4.37	3.72	4.09	3.67	4.94	5.36
Switzerland	4.58	4.20	4.04	4.80	3.12	3.73	5.04	5.05	5.42
Taiwan	3.70	4.30	5.45	3.65	2.92	3.82	4.27	5.00	4.04
Thailand	3.58	3.88	5.72	3.27	3.26	4.87	3.84	5.62	3.79
Turkey	4.42	4.02	5.79	3.74	3.02	3.92	3.82	5.43	3.67
United States	4.50	4.21	4.22	4.13	3.36	4.18	4.45	4.92	4.15
Venezuela	4.25	3.96	5.41	3.43	3.60	4.19	3.41	5.22	3.55
Zambia	4.00	4.41	5.72	3.55	2.88	5.12	4.01	5.23	3.92
Zimbabwe	4.04	4.08	5.53	3.76	3.09	4.38	4.20	5.54	4.12
Group average	4.13	4.25	5.16	3.81	3.37	4.11	4.07	5.17	4.13
Variance	0.120	0.171	0.484	0.191	0.127	0.197	0.146	0.138	0.332