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An institutional approach to cross-national distance

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Abstract
Cross-national distance is a key concept in the field of management. Previous research has conceptualized and measured cross-national differences mostly in terms of dyadic cultural distance, and has used the Euclidean approach to measuring it. In contrast, our goal is to disaggregate the construct of distance by proposing a set of multidimensional measures, including economic, financial, political, administrative, cultural, demographic, knowledge, and global connectedness as well as geographic distance. We ground our analysis and choice of empirical dimensions on institutional theories of national business, governance, and innovation systems. In order to overcome the methodological limitations of the Euclidean approach, we calculate dyadic distances using the Mahalanobis method, which is scale-invariant and takes into consideration the variance–covariance matrix. We empirically analyze four different foreign expansion choices of US companies to illustrate the importance of disaggregating the distance construct and the usefulness of our distance calculations, which we make freely available to managers and scholars.
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INTRODUCTION

The field of international business has paid much attention to the impact of cross-national distance on the decision to enter specific countries, the sequence of market entry, and the choice of entry mode, among others. These research topics lie at the core of the field of international business, and researchers have for decades used cross-national distance as a main explanatory variable (for a review see Werner, 2002). These fundamental decisions have been explored by scholars ever since the founder of the field, Stephen Hymer (1960), noted that a key factor shaping the internationalization of the firm was the so-called "liability of foreignness", which increases with the distance between the home and host countries. The eclectic paradigm (Dunning, 1993) also called attention to cross-national distance, proposing a multidimensional perspective. In this view, countries may be "distant" from each other not only in the geographic sense, but also because economic, social, cultural, or political differences make it harder for firms to operate across them.

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In spite of decades of research, the field has not yet provided a comprehensive analysis of the fact that countries differ from one another on a number of dimensions. For instance, Johanson and Vahlne (1977: 24) alluded to "differences in language, education, business practices, culture, and industrial development" as relevant dimensions. Similarly, Kogut and Singh (1988: 413) referred generically to the "characteristics of a foreign market", and proceeded to calculate dyadic distances between pairs of countries using Hofstede's (1980) cultural constructs: uncertainty avoidance, power distance, individualism, and masculinity. For their part, Barkema, Bell, and Pennings (1996: 153) mentioned "linguistic, institutional, cultural, and political factors", but measured the construct in terms of cultural distance and cultural blocs of countries. Lastly, Hennart and Larimo (1998: 517), who approached distance from a transaction-cost perspective, restricted their definition to "national cultural characteristics of the home and host countries", measuring it using Hofstede's data. These international business scholars have argued that cross-national differences of a psychic or cultural nature increase uncertainty by preventing information or knowledge to flow between countries, thus increasing the cost of doing business across borders, that is, the transaction costs associated with international business. Though conceptually recognizing the multidimensional nature of distance, most international business scholars have undertaken empirical work on cross-national distance effectively paying attention to one single dimension, while using Hofstede's (1980) data in the empirical analysis.

In this paper, we approach cross-national distance from an institutional perspective so as to capture the rich diversity of ways in which countries differ, thus following recent institutional theorizing in the field of international business (Jackson & Deeg, 2008; Pajunen, 2008). Defining and measuring cross-national distance along multiple dimensions is important, because different types of distance can affect firm, managerial or individual decisions in different ways, depending on the dimension of distance under examination. For instance, while political distance may dissuade firms from setting up a distribution subsidiary, it may encourage them to set up a manufacturing subsidiary that makes products for the host country. Armed with a multidimensional definition and empirical operationalization of distance, we argue that we can better understand when and why different types of distance have either a positive or negative impact on managerial decisions, country trade patterns, or even political relationships across countries.

Given the multidimensional nature of distance, we propose to use the Mahalanobis method of calculating dyadic distances, which is scale-invariant and takes into consideration the variance–covariance matrix, a feature that facilitates approaching distance as a construct made of multiple, partially overlapping dimensions. To illustrate the potential application of our multidimensional approach, we examine several choices of foreign entry by US companies. Considering improved model fit, higher explained variance and the differential effects of our distance measures, our empirical illustrations demonstrate the importance of disaggregating the distance construct and the usefulness of our distance calculations. We conclude by suggesting several other research questions that may be amenable to a more multidimensional approach to cross-national distance. We make the entire cross-national distance data set available to scholars (http://lauder.wharton.upenn.edu/ciber/faculty_research.asp).

EXISTING APPROACHES TO CROSS-NATIONAL DISTANCE

The most widely used approach to cross-national distance is based on Geert Hofstede's four measures of culture, originally made available in his 1980 book *Culture's consequences: International differences in work-related values* (for a review of its impact see Kirkman, Lowe, & Gibson, 2006). International business scholars found his approach appealing for two reasons. First, the emphasis on flows of information between the home and host countries lends itself to a conceptualization based on cultural and psychic differences, which raise the uncertainty and hence the costs of foreign expansion (Barkema et al., 1996; Hennart & Larimo, 1998; Johanson & Vahlne, 1977; Kogut & Singh, 1988). Second, Hofstede offered a set of cultural indicators for a large sample of countries. He collected the data through a questionnaire-based survey among managers of IBM subsidiaries around the world, conducted between 1967 and 1973 (the firm is referred to as "Hermes" in the book). Hofstede performed a factor analysis of the survey responses and proposed power distance, uncertainty avoidance, individualism, and masculinity as the key distinguishing aspects of national culture. He then used a few selected questions in the survey to measure each dimension. Originally, only 40 countries were covered. In subsequent editions the data were made available for a total of 53 countries, less than

one-third of the total number of countries in the world (Hofstede, 2001: 491–502).

While many management scholars have embraced Hofstede's cultural scores as the basis of measures of cross-national distance, criticisms of this approach abound, especially in the fields of international business (Guillén & Suárez, 2001; Shenkar, 2001), marketing (Ng, Lee, & Soutar, 2007), and accounting (Baskerville, 2003). First, Hofstede reduced all cross-national differences to the dimension of culture, thus failing to capture the rich array of dimensions along which countries differ from one another (Ghemawat, 2001). Recent scholarship has pointed out that several of Hofstede's cultural variables have their roots in economic, language, religion, and legal factors (Tang & Koveos, 2008). Second, Hofstede assumed that cross-national distances do not change over time. This assumption has been undermined by recent sociological research, which demonstrates that cultural distance, let alone economic or political distance, can change over time quite rapidly (Inglehart & Baker, 2000; Shenkar, 2001; Webber, 1969). Third, when researchers use Hofstede's cultural measures to study the behavior of individual managers, they may infer an error in interpretation if they assume that individual members of a group have the average characteristics of the population at large. This type of error is called an ecological fallacy, and results when one deduces conclusions about individuals based on aggregate or population-level data. Fourth, and related to the third criticism, Hofstede assumed that the managers of a single corporation (i.e., IBM) are representative of the overall population in a given country (Lu, 2006; Smith, 1996). Moreover, it is possible that the cultural distance perceived by employees in a cross-cultural organization such as IBM is smaller than the actual cultural distance between the two countries, owing to interactions between employees of the same company (Lu, 2006). Because of these shortcomings, Hofstede's cultural distance scores are not widely used in other social sciences such as sociology and anthropology (Baskerville, 2003), although they continue to be popular in international management research.

Given these issues, it should not be surprising that the empirical findings based on Hofstede's cultural scores can be ambiguous and contradictory. For example, in the subfield of international strategy, researchers have reported different results regarding the effects of cultural distance on subsidiary performance or foreign entry mode. Padmanabhan and Cho (1996) found that larger cultural distance encourages full ownership, Brouthers and Brouthers (2001) concluded that larger cultural distance encourages joint ownership, while Erramilli (1996) found larger cultural distance to have no significant effect on majority vs minority ownership. Studies of performance found similarly contradictory results, with some research reporting lower dissolution rates of foreign subsidiaries as cultural distance increases (Barkema et al., 1996; Park & Ungson, 1997), and others finding no such effect (Glaister & Buckley, 1999). In the entrepreneurship literature different dimensions of cultural distance have been found to be associated with entrepreneurial orientation. For example, Mueller and Thomas (2000) found that lower uncertainty avoidance increased entrepreneurial orientation, whereas Mitchell, Smith, Seawright, and Morse (2000) found that power distance and individualism entrepreneurial behavior. And in the human resource management (HRM) literature, the influence of cultural distance on the similarity between the parent's and the subsidiary's HRM systems has also yielded different results, depending on the study. For example, Gong (2003) found that larger cultural distance increases the proportion of expats, whereas Rosenzweig and Nohria (1994) examined how cultural distance can result in very different HRM systems across parents and subsidiaries. From both a macro and a micro perspective, studies using Hofstede's cultural dimensions have yielded not only conflicting results, but also evidence suggesting that additional dimensions of distance beyond cultural need to be incorporated if one is to understand how different aspects of distance, beyond culture, affect decisions and outcomes at the individual, firm, and country levels.

Over the last few years scholars have developed measures of cultural distance that represent a conceptual and empirical improvement over Hofstede's. One of them is Schwartz's (1992, 1994) cultural values framework, which has the advantages of deriving the values from theory, offering a more comprehensive set of dimensions, being based on two matched samples of more diverse and representative populations (students and teachers), and being based on data collected more recently, from 1988 to 1992 (Ng et al., 2007). Some empirical studies have shown the validity of Schwartz's cultural values (Drogendijk & Slangen, 2006). Another alternative to Hofstede's approach to cultural distance is the Global Leadership and

Organizational Behavior Effectiveness (GLOBE) study, conducted during the late 1990s (House, Hanges, Javidan, Dorfman, & Gupta, 2004: 16). GLOBE is more comprehensive and recent than Hofstede's study, but it suffers from the same problems of unidimensionality (i.e., only cultural aspects are considered), ecological fallacy, time invariance, and representativeness mentioned above. Scholars studying leadership have used the GLOBE data to measure cultural distance (e.g., Hytter, 2007). Hofstede (2006) compared the similarities and differences between GLOBE and his approach, concluding that, in spite of a very different approach, the GLOBE study still reflects the structure of his original model. Yet another recent line of research has focused on extending the concept of psychic distance (e.g., Brewer, 2007; Dow & Karunaratna, 2006).

Perhaps the most comprehensive attempt to broaden the study of cross-national distance is Ghemawat's (2001) four-dimensional approach: cultural, administrative, geographic, and economic distance. While this paper changed the way in which strategy and international business researchers see the issue of cross-national distance by focusing attention on its multidimensional nature, it does not go far enough in recognizing the complexities of distance, given that it does not take into consideration finance, politics, demography, knowledge, or global connectedness, and does not provide guidance on how to measure each dimension.

In sum, previous scholarship on cross-national distance has tended to be one-dimensional and time-invariant in nature, has based its measures on data that are not entirely representative of the rich and diverse characteristics of countries, and has offered data on fewer than one-third of the total number of countries in the world. Moreover, the method of calculation used does not generally take into consideration differences in measurement scales or correlations between the underlying variables. As we argue below, this limited characterization of cross-national distance is not sufficient to capture the manifold ways in which countries differ from one another.

AN INSTITUTIONAL APPROACH TO CROSS-NATIONAL DISTANCE

The key problem with previous research on cross-national distance and its impact is the lack of a theoretical framework that accommodates the different dimensions along which countries differ from one another. We provide such a framework by grounding our analysis and choice of distance dimensions and empirical indicators in institutional theories of cross-national differences. Following recent institutional theorizing in the field of international business (Jackson & Deeg, 2008; Pajunen, 2008), we base our approach on three conceptualizations of cross-national institutions. The first theoretical perspective on cross-national distance was pioneered by management scholar Richard Whitley (1992), and is focused on the concept of "national business systems". The second was formulated by management scholar Witold Henisz and economist Oliver Williamson (1999), and by economists Rafael La Porta, Florencio López-de-Silanes, Andrei Shleifer, and Robert Vishny (1998). It emphasizes the implications of differences in national systems of governance. The third was proposed by economist Richard Nelson and economic historian Nathan Rosenberg (1993).

National business systems are "particular arrangements of hierarchy-market relations becoming institutionalized and relatively successful in particular contexts" (Whitley, 1992: 10). Countries differ to varying degrees in terms of the characteristics of their business systems, specifically their economic, financial, and administrative practices. Whitley (1992: 231) argued that such differences originate in demographic, geographic, cultural, and political institutions, which make some countries more different, or distant, than others from a given focal country, a characteristic that affects managerial decisions.

A second important thrust in the literature on cross-national institutions deals with governance. National governance systems refer to the "set of incentives, safeguards, and dispute-resolution processes used to order the activities of various corporate stakeholders" such as owners (i.e., shareholders), managers, workers, creditors, suppliers, and customers (Kester, 1996: 109). They originate in administrative (including legal) and political institutions that historically make certain stakeholders more powerful in certain countries than others (Glendon, Gordon, & Osakwe, 1994; Henisz, 2000; Henisz & Williamson, 1999; La Porta et al., 1998). While this theoretical tradition emphasizes a smaller set of institutional dimensions than the theory of business systems, the underlying logic is also one of institutional variation that produces longer distances between countries. Governance dimensions are also relevant to managerial decisions, because firms need to establish relationships

with stakeholders in order to operate in a given country.

Finally, national innovation systems refer to configurations of institutions that foster the development of technology and innovation (Nelson & Rosenberg, 1993). A central tenet documented by this literature is that countries differ in their ability to produce knowledge, and in the extent to which they can leverage that knowledge by being connected to other countries (Furman, Porter, & Stern, 2002; Porter, 1990).

Tables 1–3 provide summary information on each of the nine dimensions, including definitions, theoretical sources, empirical examples from the international business literature, data sources, and country and time coverage. We start by considering economic distance (Whitley, 1992). The international business literature has tended to focus on three specific indicators of economic differences across countries (for a review see Caves, 1996). Countries differ in terms of their income level (GDP per capita), prevailing inflation rates, and intensity of trade with the rest of the world (exports plus imports as a proportion of GDP). These indicators are important, because they are correlated with consumer purchasing power and preferences, macroeconomic stability, and the openness of the economy to external influences. These factors have been found to influence, for instance, foreign market entry mode, firm survival

Table 1 Dimensions of cross-national distance

Dimension of distance	*Definition*	*Theoretical sources in the institutional literature*	*Examples of empirical studies in the international business literature*
Economic	Differences in economic development and macroeconomic characteristics	Whitley (1992); Caves (1996)	Campa and Guillén (1999); Iyer (1997); Yeung (1997); Zaheer and Zaheer (1997)
Financial	Differences in financial sector development	Whitley (1992); La Porta et al. (1998)	Rueda-Sabater (2000); Capron and Guillén (2009)
Political	Differences in political stability, democracy, and trade bloc membership	Whitley (1992); Henisz (2000); Henisz and Williamson (1999)	Gastanaga, Jeffrey, Nugent, and Pashamova (1998); Delios and Henisz (2000, 2003); Henisz and Delios (2001); García-Canal and Guillén (2008)
Administrative	Differences in colonial ties, language, religion, and legal system	Whitley (1992); Henisz (2000); Ghemawat (2001); La Porta et al. (1998)	Lubatkin, Calori, Very, and Veiga (1998); Guler and Guillén (2010)
Cultural	Differences in attitudes toward authority, trust, individuality, and importance of work and family	Whitley (1992); Hofstede (1980); Inglehart (2004)	Johanson and Vahlne (1977); Kogut and Singh (1988); Barkema et al. (1996); Hennart and Larimo (1998)
Demographic	Differences in demographic characteristics	Whitley (1992)	Huynh, Mallik, and Hettihewa (2006)
Knowledge	Differences in patents and scientific production	Nelson and Rosenberg (1993); Furman et al. (2002)	Anand and Kogut (1997); Shaver and Flyer (2000); Berry (2006); Nachum, Zaheer, and Gross (2008); Guler and Guillén (2010)
Connectedness	Differences in tourism and Internet use	Nelson and Rosenberg (1993); Guillén and Suárez (2005)	Oxley and Yeung (2001)
Geographic	Great circle distance between geographic center of countries	Anderson (1979); Deadorff (1998)	Wolf and Weinschrott (1973); Hamilton and Winters (1992); Fratianni and Oh (2009)

Table 2 Indicator component variables used in the calculation of distance dimensions

	Dimension	*Component variables*
1.	*Economic distance*	
	Income	GDP per capita (2000 US$)
	Inflation	GDP deflator (% GDP)
	Exports	Exports of goods and services (% GDP)
	Imports	Imports of goods and services (% GDP)
2.	*Financial distance*	
	Private credit	Domestic credit to private sector (% GDP)
	Stock market cap	Market capitalization of listed companies (% GDP)
	Listed companies	Number of listed companies (per 1 million population)
3.	*Political distance*	
	Policy-making uncertainty	Political stability measured by considering independent institutional actors with veto power
	Democratic character	Democracy score
	Size of the state	Government consumption (% GDP)
	WTO member	Membership in WTO (GATT before 1993)
	Regional trade agreement	Dyadic membership in the same trade bloc
4.	*Administrative distance*	
	Colonizer–colonized link	Whether dyad shares a colonial tie
	Common language	% population that speak the same language in the dyad
	Common religion	% population that share the same religion in the dyad
	Legal system	Whether dyad shares the same legal system
5.	*Cultural distance*	
	Power distance	WVS questions on obedience and respect for authority
	Uncertainty avoidance	WVS questions on trusting people and job security
	Individualism	WVS questions on independence and the role of government in providing for its citizens
	Masculinity	WVS questions on the importance of family and work
6.	*Demographic distance*	
	Life expectancy	Life expectancy at birth, total (years)
	Birth rate	Birth rate, crude (per 1000 people)
	Population under 14	Population ages 0–14 (% of total)
	Population under 65	Population ages 65 and above (% of total)
7.	*Knowledge distance*	
	Patents	Number of patents per 1 million population
	Scientific articles	Number of scientific articles per 1 million population
8.	*Global connectedness distance*	
	International tourism expenditure	International tourism, expenditures (% GDP)
	International tourism receipts	International tourism, receipts (% GDP)
	Internet use	Internet users per 1000 people
9.	*Geographic distance*	
	Great circle distance	Great circle distance between two countries according to the coordinates of the geographic center of the countries

and performance, among other variables (for a review of the evidence see Caves, 1996). Numerous studies in international business have examined the impact of economic distance on the choice of foreign market, and of entry mode (e.g., Iyer, 1997; Yeung, 1997; Zaheer & Zaheer, 1997). Researchers

Table 3 Distance dimensions, sources, year availability, and country coverage

	Dimension	*Source*	*Years available*	*No. of countries (in 2004)*
1.	*Economic distance*			
	Income	WDI	1960–2005	179
	Inflation	WDI	1960–2005	157
	Exports	WDI	1960–2005	165
	Imports	WDI	1960–2005	165
2.	*Financial distance*			
	Private credit	WDI	1960–2005	122
	Stock market cap	WDI	1988–2005	122
	Listed companies	WDI	1988–2005	122
3.	*Political distance*			
	Policy-making uncertainty	POLCONV	1960–2005	155
	Democracy score	Freedom House	1960–2003	151
	Size of the state	WDI	1960–2005	155
	World trade agreements	WTO	1960–2005	133
	Regional trade agreements	WTO	1960–2005	133
4.	*Administrative distance*			
	Colonizer–colonized link	CIA Factbook	Constant	198
	Common language	CIA Factbook	Constant	198
	Common religion	CIA Factbook	Constant	198
	Legal system	La Porta et al., 1998	Constant	198
5.	*Cultural distance*			
	Power distance	WVS	1980–2004	68
	Uncertainty avoidance	WVS	1980–2004	66
	Individualism	WVS	1980–2004	69
	Masculinity	WVS	1980–2004	69
6.	*Demographic distance*			
	Life expectancy	WDI	1960–2004	202
	Birth rate	WDI	1960–2004	202
	Population under 14	WDI	1960–2005	203
	Population under 65	WDI	1960–2005	203
7.	*Knowledge distance*			
	Patents	USPTO	1977–2005	166
	Scientific articles	WDI and ISI	1960–2003	110
8.	*Global connectedness distance*			
	International tourism expenditure	WDI	1995–2004	119
	International tourism receipts	WDI	1995–2004	115
	Internet users	WDI	1995–2004	209
9.	*Geographic distance*			
	Great circle distance	CIA Factbook	Constant	196

have also developed *ad hoc* measures of economic distance, such as Campa and Guillén's (1999) competitor development index, based on the income per capita of the country in which the focal firm's most important competitors are located.

The institutional literature on cross-national differences also emphasizes the financial dimension.

Countries at varying levels of economic development have, over time, evolved quite different financial systems, with manifold implications for the way in which companies and their competitors fund their operations (La Porta et al., 1998; Whitley, 1992). Scholars of financial differences across countries have considered mainly indicators related to the equity and credit markets. We included in our analysis the market capitalization of listed companies, the number of listed companies, and the amount of private credit available (all as a percentage of GDP). These indicators have been proposed and used by the literature on cross-national financial systems (Berglof, 1988; La Porta et al., 1998; Steinherr & Huveneers, 1994). Researchers in the field of international business have used this approach to examine corporate governance, foreign investment, and corporate acquisitions (e.g., Capron & Guillén, 2009; Rueda-Sabater, 2000).

In addition to different levels of economic and financial market development, the institutional literature has also emphasized that countries differ in terms of the nature of their political systems (Henisz, 2000; Henisz & Williamson, 1999; Whitley, 1992). Scholars have looked at political differences among countries mostly in dichotomous terms, for example, emphasizing the differences between democratic and autocratic regimes. Our approach follows the extant literature in characterizing countries along continuous political dimensions, such as institutional checks and balances (e.g., Demirbag, Glaister, & Tatoglu, 2007; Dow & Karunaratna, 2006; Henisz, 2000), democratic character, the size of the state relative to the economy, and external trade associations (Brewer, 2007; Hirschberg, Sheldon, & Dayton, 1994). These variables have been found to correlate with the choice of foreign markets to enter, the choice of entry mode, and foreign direct investment flows (Delios & Henisz, 2000, 2003; García-Canal & Guillén, 2008; Gastanaga et al., 1998; Henisz & Delios, 2001).

The next key dimension emphasized in the institutional literature, administrative distance, refers to differences in bureaucratic patterns due to colonial ties, language, religion, and the legal system (Ghemawat, 2001; Henisz, 2000; La Porta et al., 1998; Whitley, 1992). Researchers have measured administrative distance by determining whether countries share a common language (Wolf & Weinschrott, 1973) or a common legal system (Guillén & Suárez, 2005; La Porta et al., 1998), and whether they have or have had a colonial relationship (Bröcker & Rohweder, 1990). Research on linguistic distance, defined as how "distant" from English a particular language is, in the sense of how difficult it is for an English speaker to learn it (e.g., Hutchinson, 2005), has examined the ability of immigrants to realize the potential benefits from networking and to effectively use knowledge of their home-country tastes and markets to promote trade and commerce between their host country and their country of origin (Chiswick & Miller, 1998). We included colonizer–colonized links as well as common language, legal and religious institutions as part of this measure. One could argue that administrative distance is related to both cultural and political distance, but we believe that it is distinct, because it goes beyond national political systems to include both formal and informal institutional arrangements that transcend the purely political nature of the nation-state. Research has found that these measures correlate with the occurrence of cross-border mergers and acquisitions, and with the choice of foreign markets to enter (e.g., Guler & Guillén, 2010; Lubatkin et al., 1998).

The next dimension noted in Table 3 is cultural distance. As noted above, Hofstede (1980) and many other researchers have long demonstrated the importance of differences in cultural values and norms across countries, and their impact on foreign market entry, entry mode choice, and other important research topics (Werner, 2002). The institutional theory of business systems also highlights culture as a relevant dimension (Whitley, 1992), as do strategy scholars (Ghemawat, 2001). The international business literature includes a number of influential studies of the impact of cultural distance on the foreign expansion of the firm (Barkema et al., 1996; Hennart & Larimo, 1998; Johanson & Vahlne, 1977; Kogut & Singh, 1988). Recent studies have considered additional cultural aspects across countries (Brewer, 2007; Dow & Karunaratna, 2006; House et al., 2004; Schwartz, 1992, 1994). To create our measure of cultural distance we used public opinion data from four waves of the World Values Survey (WVS; Inglehart, 2004). Given the popularity of Hofstede's dimensions of cultural distance, we constructed our measures to mimic Hofstede's uncertainty avoidance, power distance, individualism, and masculinity.[1] Scholars using the WVS have found that cultural values evolve rather quickly over time (Inglehart & Baker, 2000). The WVS allows us to

capture such changes, because it is conducted around the world every 3 or 4 years. We interpolated the data for years in between waves of the survey.

Institutional theory also identifies demography as a key dimension of cross-national difference (Whitley, 1992). Countries differ in terms of the size, growth, age structure, and qualities of their populations. These dimensions have direct implications for market attractiveness and growth potential. We focused our analysis on differences in life expectancy rates, birth rates, and the age structure of the population, which attest to fundamental characteristics of the population of countries that may affect consumer behavior and other market-related processes of interest to firms. We interpolate the demographic distance, because birth and life expectancy rates are available for most countries only every few years, especially when a population census is conducted (United Nations, 2006). Researchers in the international business area have used demographic variables to study patterns of international corporate expansion and share prices (e.g., Caves, 1996; Huynh et al., 2006).

The institutional literature also proposes that countries differ in terms of their capacity to create knowledge and to innovate, with important implications for their role in the global economy (Furman et al., 2002; Nelson & Rosenberg, 1993). Proximity to knowledge has been argued to influence the location choice of multinational firms (Anand & Kogut, 1997; Berry, 2006; Guler & Guillén, 2010; Nachum et al., 2008; Shaver & Flyer, 2000), because of the potential for spillovers. Talent, innovation, and creativity are not distributed evenly across locations (Florida, 2002), and this affects the distance between countries. Following the literature on national innovation systems, we measured knowledge distance using the number of patents and of scientific articles per capita (Furman et al., 2002; Nelson & Rosenberg, 1993).

The last dimension of cross-national distance identified in the institutional literature focuses on the connectedness of a country with the rest of the world. Global connectedness captures the ability of resident individuals and companies to interact with other parts of the world, obtain information, and diffuse their own activities (Oxley & Yeung, 2001). Following the literature in this area (for a review see Guillén & Suárez, 2005), we captured this dimension using measures of international tourism expenditures as a percentage of GDP, international tourism receipts as a percentage of GDP, and Internet users as a percentage of the population.

In addition to the eight dimensions of distance based on institutional differences across countries, we also included geographic distance in our dataset and analyses, because it has long been recognized as having an effect on trade, foreign investment, and other types of economic activity taking place between countries (Anderson, 1979; Deadorff, 1998). Geographic distance increases the costs of transportation and communication. Scholars who use gravity models in the international business and international trade literatures have long recognized the important role of geographic distance (Fratianni & Oh, 2009; Hamilton & Winters, 1992; Wolf & Weinschrott, 1973). Different methods have been used to examine geographic distance between pairs of countries. For example, Chen (2004) calculated geographic distance according to the latitude and longitude of the main city in each region or country, and found that geographic distance decreased international trade between pairs of countries. Krishna (2003) used the direct line distance to measure geographic distance. We calculate geographic distance using the great circle method.[2] Gravity models in the international economics literature have considered how geographical distance between two countries affects bilateral trade flows. In these models, trade between two countries is directly related to size (i.e., GDP) and inversely related to geographic distance (Anderson, 1979; Deadorff, 1998).

An important feature of our approach is that we compute distance separately for each dimension, based on the empirical indicators mentioned above, thus allowing researchers to utilize the one that theoretically fits their research question best. For example, although Kogut and Singh (1988) considered how Hofstede's cultural distance measures may affect a firm's choice among joint ventures, acquisitions and greenfield entry modes, we believe that there are several other dimensions of distance that can affect those choices (see Lopez-Duarte & García-Canal, 2002).

CALCULATION METHOD

There is no agreement in the literature as to what is the best way to measure the distance between two points or objects. There are, however, five desirable properties that distance measures ought to exhibit: symmetry, non-negativity, identification, definiteness, and triangle inequality (see Table 4). Perhaps the most widely used measure is the Euclidean

Table 4 Properties of different methods for calculating dyadic distance

Property	*Explanation*	*Euclidean*	*Euclidean squared*	*Mahalanobis*
1. Symmetry	$d_{ij}=d_{ji}$ for all i and j	Yes	Yes	Yes
2. Non-negativity	$d_{ij} \geqslant 0$ for all i and j	Yes	Yes	Yes
3. Identification	$d_{ii}=0$ for all i	Yes	Yes	Yes
4. Definiteness	$d_{ii}=0$ only if $x_i=x_j$	Yes	Yes	Yes
5. Triangle inequality	$d_{ij} \leqslant d_{ik}+d_{jk}$ for all i, j, and k	Yes	No	Yes
6. Sensitive to correlation	Variables not assumed to be orthogonal to each other	No	No	Yes
7. Sensitive to variance	Variables not assumed to have equal variance	No	No	Yes
8. Scale invariant	Measure not sensitive to scale of variables	No	No	Yes
9. Ability to handle overdetermination	Number of points can be smaller than number of variables	Yes	Yes	No

Sources: Mimmack, Mason, and Galpin (2001); Seber (1984).

method, which is defined as the geometrically shortest possible distance between two points. The traditional Euclidean distance measure meets all five of the desirable characteristics listed above. Another commonly used measure is the Euclidean squared distance, which meets all of the criteria except triangle inequality. A measure that displays all five properties is referred to as a *metric*.

A key problem with the Euclidean method for calculating distance is that, although it is a metric, it does not take into consideration the correlation between the variable indicators used to computing it. When two or more variables are highly correlated with each other, they are capturing the same characteristic. Therefore a distance measure that ignores correlation would be giving more importance or weight to the characteristic measured by the correlated variables. A second problem with Euclidean distance is that it does not take into account the variance of the variables. A third, related shortcoming is that it is sensitive to the scale of measurement.

An alternative method, and the one that we favor in this paper, given our multidimensional definition, is the Mahalanobis distance, originally formulated in 1936.[3] Scholars in chemistry (De Maesschalck, Jouan-Rimbaud, & Massart, 2000), climatology (Mimmack et al., 2001), and other fields use it when it comes to solving problems related to clustering, multivariate calibration, pattern recognition, outlier detection, and process control (Cohen, 1969; Rousseeuw & Leroy, 2003; Seber, 1984). The Mahalanobis method meets the five desirable criteria listed above, and it also surmounts the three key problems associated with the Euclidean method, because it takes into account the information contained in the variance–covariance matrix and is scale-invariant. Scholars familiar with principal-component analysis will realize that the Mahalanobis distance is equivalent to the Euclidean distance calculated with the standardized values of the principal components (De Maesschalck et al., 2000). The main disadvantages of the Mahalanobis method when compared with the Euclidean are that none of the variables can be perfectly collinear, and that there have to be more points than variables in the data so that one can calculate the inverse of the variance–covariance matrix (see Table 4).

When measuring distances between pairs of countries, the Mahalanobis distance is a better choice than the Euclidean method, for three reasons. First, the variables that characterize countries tend to be very highly correlated with one another. For instance, the various dimensions of culture (e.g., power distance, individualism) or economic development (e.g., GDP per capita, inflation) are highly correlated with each other. Second, the variance of the variables differs massively, both cross-sectionally and over time (Pritchett, 1997; United Nations, 2006). And third, variables that characterize countries are typically measured on different scales. For instance, GDP per capita and inflation are measured using different units. The Euclidean approach does not allow for multiple scales.

Table 5 shows the correlations between pairs of our nine dimensions of distance, each calculated with the greatest number of observations available. The coefficients are generally low, suggesting that distances between pairs of countries can be very different, depending on the dimension chosen. While the correlation between the Euclidean and Mahalanobis distance measures based on Hofstede's scores are quite high, the correlation between the

Table 5 Correlation matrix for distance dimensions[a,b,c]

		1	2	3	4	5	6	7	8	9	10	11
1.	Hofstede Euclidean distance	1										
		(85,792)										
2.	Hofstede Mahalanobis distance	0.87	1									
		(85,792)	(85,792)									
3.	Economic distance	0.07	0.02	1								
		(66,378)	(66,378)	(460,000)								
4.	Financial distance	0.07	0.07	0.22	1							
		(25,404)	(25,404)	(78,914)	(83,238)							
5.	Political distance	−0.04	−0.08	−0.02	−0.05	1						
		(55,094)	(55,094)	(240,000)	(47,811)	(250,000)						
6.	Administrative distance	0.19	0.17	0.08	0.21	−0.01	1					
		(77,903)	(77,903)	(330,000)	(56,027)	(230,000)	(630,000)					
7.	WVS cultural distance	−0.05	−0.07	−0.08	0.17	−0.21	0.07	1				
		(30,894)	(30,894)	(35,006)	(13,832)	(25,165)	(49,101)	(54,845)				
8.	Demographic distance	0.22	0.2	0.13	0.02	0.16	0.04	−0.03	1			
		(85,792)	(85,792)	(460,000)	(83,238)	(250,000)	(630,000)	(54,845)	(870,000)			
9.	Knowledge distance	0.18	0.11	0.17	0.2	0.06	0.18	0.09	0.09	1		
		(32,899)	(32,899)	(100,000)	(43,688)	(80,490)	(110,000)	(20,484)	(130,000)	(130,000)		
10.	Global connectedness distance	0.15	0.08	0.23	0.13	0.13	0.09	0.11	0.13	0.11	1	
		(12,158)	(12,158)	(68,621)	(41,058)	(40,366)	(52,397)	(8861)	(73,629)	(28,100)	(73,629)	
11.	Geographic distance	0.07	0.02	0.03	−0.02	0.1	−0.07	−0.06	0.01	0.02	0.01	1
		(85,792)	(85,792)	(360,000)	(62,202)	(250,000)	(620,000)	(52,649)	(700,000)	(120,000)	(58,472)	(700,000)

[a]Numbers of observations are in parentheses.
[b]Unless otherwise noted, all distances are calculated using the Mahalanobis method.
[c]Correlations greater than 0.006 are significant at $p < 0.05$.

distance measuress based on Hofstede's scores and our culture distance measure based on the WVS is quite low. We believe this is mainly because our measure varies over time, and is based on a sample representative of the adult population of the country.

EMPIRICAL ILLUSTRATIONS

To illustrate the value of our multidimensional approach to cross-national distance, we examine the choice of foreign market entry by US companies in four different contexts. Across our empirical examples, we use the same random sample of 871 US publicly traded manufacturing firms. This sample is representative of all firms that report data to Compustat in terms of mean sales and assets. We downloaded all financial information on US parent firms between 1993 and 2005. The starting point for our time period was determined by the availability of electronic data from the *Directory of corporate affiliates* (our source for foreign subsidiary entry information). Of the total 871 firms, 412 were found to have foreign subsidiaries.

The unit of analysis is the firm–country–year. We considered firms to be at risk of entering a country if any other US firm in the sample had invested in that country by the end of 2005. After matching the US panel of firms with the distance measures described above, we ended up with a sample size of 252,040 firm–country–year observations. Across our models, the dependent variable, foreign market entry, is dichotomous. The predictor variables of interest include the economic, financial, political, administrative, cultural, demographic, knowledge, and global connectedness distance dimensions described above. For the purposes of illustration, we included in the regression models as many distance dimensions as possible, while ensuring that the correlations across these measures would not cause multicollinearity problems. We also included several firm-level control variables in each regression. All control variables are lagged by 1 year, and we included year and industry dummies to control for potential year and industry heterogeneity.

We estimated the models using logistic regression with robust standard errors. We clustered by parent firm in all models reported in Table 7. Table 6 shows the descriptive statistics and correlations for all of our distance and control variables. We excluded global connectedness from the analysis, because its limited availability over time reduces the sample size by about one-third.

Table 6 US sample descriptive statistics and correlations (N=252,040, without global connectedness distance)[a,b]

	Variable	*Mean*	*s.d.*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
1.	Entry	0.06	0.23	1.00													
2.	Hofstede Euclidean distance	2.71	0.94	−0.16	1.00												
3.	Hofstede distance	7.15	3.78	−0.13	0.85	1.00											
4.	Economic distance	14.86	9.87	−0.13	0.38	0.13	1.00										
5.	Financial distance	6.94	5.23	−0.11	0.33	0.18	0.52	1.00									
6.	Political distance	175.83	84.64	−0.06	0.18	0.10	0.33	0.39	1.00								
7.	Administrative distance	134.50	64.78	−0.06	−0.01	0.10	−0.19	−0.02	0.10	1.00							
8.	WVS cultural distance	2.49	1.52	−0.07	0.44	0.34	0.26	0.20	0.17	0.11	1.00						
9.	Demographic distance	3.82	2.98	−0.07	0.52	0.29	0.51	0.24	0.31	−0.17	0.34	1.00					
10.	Knowledge distance	67.96	40.47	−0.02	0.00	−0.06	0.35	0.34	0.40	−0.03	−0.05	0.03	1.00				
11.	Geographic distance	8.23	2.49	−0.10	0.22	0.15	0.23	0.17	0.42	0.15	0.23	0.35	−0.02	1.00			
12.	Log of sales	4.48	2.49	0.31	0.00	0.00	0.01	0.01	0.02	0.00	0.00	0.00	0.03	0.00	1.00		
13.	R&D intensity	0.14	0.42	−0.05	0.00	0.00	0.01	0.02	0.03	0.00	0.00	0.00	0.02	0.00	−0.28	1.00	
14.	Firm host-country experience	0.03	0.31	0.14	0.00	0.00	0.01	0.02	0.02	0.01	0.00	0.00	0.02	0.00	0.15	−0.02	1.00

[a]Unless otherwise noted, all distances are calculated using the Mahalanobis method.
[b]Correlations greater than 0.005 are significant at $p<0.05$.

Table 7 Logistic regressions estimating the effects of distance on foreign market entry by US manufacturing firms, 1993–2005[a,b]

Variables	*1*	*2*	*3*	*4*	*5*
Hofstede Euclidean distance		−0.87***			
		(0.03)			
Hofstede Mahalanobis distance			−0.21***		
			(0.01)		
WVS cultural distance[b]				−0.33***	−0.07***
				(0.02)	(0.02)
Financial distance					−0.17***
					(0.01)
Administrative distance					−0.00***
					(0.00)
Demographic distance					−0.03**
					(0.01)
Knowledge distance					−0.02***
					(0.00)
Geographic distance					−0.14***
					(0.01)
Log of sales	0.71***	0.77***	0.75***	0.72***	0.79***
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
R&D intensity	−0.56	−0.41	−0.44	−0.52	−0.36
	(0.65)	(0.69)	(0.67)	(0.66)	(0.70)
Firm experience	0.19***	0.23***	0.23***	0.21***	0.26***
	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)
Year dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Number of observations	252,040	252,040	252,040	252,040	252,040
Pseudo R^2	0.26	0.33	0.31	0.28	0.36
Chi-square	1103.90***	2323.11***	1936.67***	1494.53***	2478.38***
Log pseudo-likelihood	−41,979.00	−37,971.88	−39,099.56	−40,866.35	−36,571.14
Compare model					(3) and (5)
Additional d.o.f.					5
Difference LogL					5056.82***

Table 7 (*continued*)

Variables	*6 (Firms with host-country experience)*	*7 (Firms with host-country experience)*	*8 (Firms without host-country experience)*	*9 (Firms without host-country experience)*	*10 (Manufacturing subs)*	*11 (Manufacturing subs)*	*12 (Distribution subs)*	*13 (Distribution subs)*
Hofstede Euclidean distance								
Hofstede Mahalanobis distance	−0.05***		−0.19***		−0.19***		−0.17***	
	(0.02)		(0.01)		(0.01)		(0.01)	
Financial distance		0.02		−0.06*		−0.15***		−0.15***
		(0.04)		(0.03)		(0.01)		(0.01)
Political distance						−0.00*		0.00***
						(0.00)		(0.00)
Administrative distance		−0.00**		−0.00***		−0.01***		−0.01***
		(0.00)		(0.00)		(0.00)		(0.00)
WVS cultural distance[b]		0.00		−0.04*		−0.04*		−0.11***
		(0.03)		(0.02)		(0.02)		(0.02)
Demographic distance		−0.00		−0.02***		−0.00		−0.06***
		(0.00)		(0.00)		(0.01)		(0.01)
Knowledge distance		−0.02		−0.14***		−0.01***		−0.02***
		(0.00)		(0.02)		(0.00)		(0.00)
Geographic distance						−0.11***		−0.09***
						(0.02)		(0.01)
Log of sales	0.24***	0.24***	0.73***	0.78***	0.61***	0.63***	0.71***	0.74***
	(0.06)	(0.06)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
R&D intensity	2.46	2.51	0.09	0.15	−4.99***	−5.04***	0.22***	0.23***
	(1.96)	(1.93)	(0.44)	(0.19)	(1.32)	(1.37)	(0.05)	(0.05)
Firm experience	Dropped	Dropped	Dropped	Dropped	0.12***	0.14***	0.15***	0.17***
					(0.04)	(0.04)	(0.05)	(0.05)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	13,062	13,062	238,978	238,978	240,162	240,162	240,162	240,162
Pseudo R^2	0.08	0.09	0.28	0.32	0.28	0.32	0.28	0.31
Chi-square	218.75***	232.50***	1253.59***	1379.06***	1122.43***	1425.41***	1324.18***	1931.25***
Log pseudo-likelihood	−5373.21	−5360.11	−14,720.82	−13,988.24	−21,728.72	−20,692.31	−26,010.65	−24,824.91
Compare models		(6) and (7)		(8) and (9)		(10) and (11)		(12) and (13)
Additional d.o.f.		5		5		6		6
Difference LogL		26.2***		1465.16***		2072.82***		2371.45***

Table 7 (*continued*)

Variables	*14 (Low-income countries)*	*15 (Low-income countries)*	*16 (High-income countries)*	*17 (High-income countries)*	*18 (Low R&D intensity firms)*	*19 (Low R&D intensity firms)*	*20 (High R&D intensity firms)*	*21 (High R&D intensity firms)*
Hofstede Euclidean distance								
Hofstede Mahalanobis	−0.18***		−0.16***		−0.21***		−0.19***	
distance	(0.02)		(0.01)		(0.01)		(0.02)	
Financial distance		−0.15***		−0.14***		−0.17***		−0.18***
		(0.02)		(0.01)		(0.01)		(0.02)
Political distance		−0.00***		−0.00***				
		(0.00)		(0.00)				
Administrative distance		0.01***		−0.01***		−0.01***		−0.00***
		(0.00)		(0.00)		(0.00)		(0.00)
WVS cultural distance[b]		0.19***		−0.15***		−0.05*		−0.15***
		(0.04)		(0.02)		(0.02)		(0.04)
Demographic distance		0.08**		−0.00		−0.02		−0.07***
		(0.03)		(0.01)		(0.01)		(0.02)
Knowledge distance		−0.17***		−0.02***		−0.02***		−0.02***
		(0.03)		(0.00)		(0.00)		(0.00)
Geographic distance		−0.28***		0.02		−0.17***		−0.05*
		(0.02)		(0.02)		(0.01)		(0.02)
Log of sales	0.84***	0.90***	0.76***	0.80***	0.68***	0.72***	0.91***	0.98***
	(0.06)	(0.07)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
R&D intensity	−2.10	−1.96	−0.18	−0.08	Dropped	Dropped	Dropped	Dropped
	(1.59)	(1.71)	(0.63)	(0.63)				
Firm experience	0.23***	0.26***	0.26***	0.31***	0.19***	0.22***	0.26**	0.36**
	(0.06)	(0.07)	(0.07)	(0.07)	(0.06)	(0.06)	(0.10)	(0.13)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	89,253	89,253	150,909	150,909	136,541	136,541	115,268	115,268
Pseudo R^2	0.33	0.39	0.31	0.35	0.25	0.30	0.43	0.47
Chi-square	1136.50***	1269.92***	1497.26***	2099.58***	1291.72***	1908.03***	953.56***	1154.29***
Log pseudo-likelihood	−7939.58	−7141.40	−29,313.63	−27,543.33	−28,675.99	−26,755.76	−10,019.41	−9282.88
Compare models		(14) and (15)		(16) and (17)		(18) and (19)		(20) and (21)
Additional d.o.f.		6		6		5		5
Difference LogL		1584.35***		3540.59***		3845.31***		1473.06***

[a]Robust standard errors shown in parentheses.
[b]Unless otherwise noted, all distances are calculated using the Mahalanobis method.
*p < 0.05; **p < 0.01; ***p < 0.001.

Table 7 presents the regression results. Model 1 is the baseline model, which includes only parent firm controls, industry dummies and year dummies. Model 2 includes parent firm controls and the Hofstede Euclidean distance measure, which has a negative and significant impact on firm entry decisions, consistent with Kogut and Singh's (1988) classic findings that firms are less likely to invest in countries that are more culturally distant from their home country. In Model 3 we replace Hofstede's Euclidean distance with the Hofstede Mahalanobis distance measure, which behaves in a similar way. In Model 4 we use our time-varying cultural distance measure based on the WVS data, which also negatively and significantly influences firm entry decisions. In Model 5 we include several of our distance measures at once. As can be seen in this column, each of our distance variables negatively and significantly influences firm entry decisions when considering all entries by all firms.

In Models 6–21 of Table 7 we show how both Hofstede's cultural distance measure and our cross-national distance dimensions affect the choices of foreign market entry by US companies, in four different contexts.[4] First, we show how Hofstede's cultural distance affects firms with and without prior host-country experience. In Models 6 and 8 we see that Hofstede significantly negatively influences firm foreign entry decisions for firms with and without prior experiences in host-country markets. In contrast, when we consider our disaggregated measures of cross-national distance (in Models 7 and 9), we see differential effects across our disaggregated dimensions of distance. For firms with prior host-country experience our cultural, demographic, knowledge, and geographic distance dimensions do not significantly affect subsequent entry decisions, whereas these dimensions of distance are significant in the case of firms without such experience. To assess the validity and usefulness of our approach, we consider three comparisons. First, we used Wald tests to examine for significant differences across the coefficients in the subgroups. The coefficients for financial distance (chi-squared=12.31, $p<0.01$), knowledge distance (chi-squared=9.45, $p<0.01$), administrative distance (chi-squared=3.93, $p<0.05$), and geographic distance (chi-squared=6.02, $p<0.05$) are significantly different across Models 7 and 9. Second, given concerns about comparing coefficients directly in nonlinear logit models (Allison, 1999; Hoetker, 2007), we consider improvements in fit across our models, considering both the improvement in R^2 values and log-likelihood improvements across our models. In models that incorporate Hofstede's cultural distance vs our dimensions of distance for firms that lack host-country experience (Models 8 and 9, respectively), there is an improvement in R^2 from 0.28 to 0.32. In addition, there is a significant improvement in the log-likelihood ratio from Models 8 to 9. These three comparisons suggest that, as firms accumulate experiences in host countries, our measures of distance between the home and host countries have varying degrees of constraining influences on managerial decision-making. Because firm managers can learn about different dimensions of cross-national distance as they operate in host countries, subsequent expansion into that country is influenced by a different set of factors than the initial entry choice.

In Models 10–13 of Table 7 we show the results for our second illustrative example. Here, we consider how our distance dimensions can differentially affect the choice of manufacturing vs distribution subsidiaries. In Models 10 and 12 we see that Hofstede's cultural distance measure significantly negatively influences firm foreign entry decisions for both manufacturing and distribution subsidiaries. In contrast, when we consider our disaggregated measures of cross-national distance, we again see differential effects across our disaggregated dimensions of distance on distribution and manufacturing subsidiaries. In Models 11 and 13 we see that the demographic and political distance measures behave differently for manufacturing vs distribution choices by firms. Political distance has the opposite effect across the manufacturing and distribution choices by firms, while demographic distance is significant only for distribution subsidiary choices. Further, though they have the same sign and significance, our cultural and geographic distance dimensions have a significantly larger impact in one model than in the other. There is no significant difference across the Hofstede cultural distance measure in Models 10 and 12. Using Wald tests, the coefficients demographic distance (chi-squared=4.19, $p<0.05$), political distance (chi-squared=3.86, $p<0.05$), and geographic distance (chi-squared=4.52, $p<0.05$) are statistically significantly different across the manufacturing and distribution subgroups in Models 11 and 13. Comparing the R^2 values across these models shows an increase from 0.28 to 0.32 in the manufacturing decisions of firms, considering only Hofstede's measure (Model 10) vs our

multidimensional distance measures (Model 12), and an increase from 0.28 to 0.31 in the distribution subsidiary decisions of firms, considering only Hofstede's measure (Model 11) vs our multidimensional distance measures (Model 13). In addition, there is a significant improvement in the log-likelihood from Models 10 to 12 and from Models 11 to 13. Overall, these results show how our distance dimensions can differentially affect foreign manufacturing and distribution choices.

In Models 14–17 in Table 7 we consider how distance affects the choice of high- and low-income country locations by firms. In Models 14 and 16 we see that Hofstede's cultural distance measure significantly negatively influences firm entry decisions for both high- and low-income countries. In contrast, our disaggregated measures of cross-national distance differentially affect firm entry decisions across high- and low-income countries. Models 15 and 17 show that cultural, administrative, and demographic distances positively and significantly influence firm decisions to enter low-income countries, whereas these same distance dimensions negatively influence firm decisions to enter high-income countries. Wald tests show that the coefficients for cultural distance (chi-squared=4.01, $p<0.05$) and administrative distance (chi-squared=5.07, $p<0.01$) are significantly different from each other. Comparing the R^2 values across these models shows an increase from 0.33 to 0.39 in the low-income country choices of firms considering only Hofstede's measure (Model 14) vs our multidimensional distance measures (Model 15), and an increase from 0.31 to 0.35 in the high-income country choices of firms considering only Hofstede's measure (Model 16) vs our multidimensional distance measures (Model 17). In addition, there is a significant improvement in the log-likelihood of Model 15 over Model 14, and of Model 17 over Model 16.

Finally, in our fourth example, we consider how distance dimensions affect the decisions of firms pursuing different product market strategies. In Models 18–21 we distinguish between firms with high and low R&D intensities. In Models 18 and 20 we see that Hofstede's cultural distance measure continues to negatively and significantly influence both high and low R&D-intensive firm decisions to enter foreign markets. However, when we include our multidimensional distance measures in Models 19 and 21, we see that demographic distance is not significant for low R&D-intensive firms, although it is for high R&D-intensive firms. Wald tests reveal that the coefficients for demographic distance are significantly different (chi-squared=7.02, $p<0.01$). Although some of the other distance coefficients are negative and significant in both Models 19 and 21, Wald tests reveal significant differences across these negative and significant dimensions. For example, although our WVS cultural distance measure is negative and significant across both subsamples, there is a significant difference across the coefficients for this dimension (chi-squared=8.10, $p<0.01$). Comparing the R^2 values across these models shows an increase from 0.25 to 0.30 for firms with low R&D intensity, considering only Hofstede's measure (Model 18) vs our multidimensional distance measures (Model 19), and an increase from 0.43 to 0.47 for firms with high R&D intensity, considering only Hofstede's measure (Model 20) vs our multidimensional distance measures (Model 21). In addition, there is a significant improvement in the log-likelihood of Model 19 over Model 18, and of Model 21 over Model 20.

By exploring different levels of firm foreign experience, business functions, location choices, and product market strategies, our empirical illustrations show that our distance dimensions matter in different ways to different firm expansion choices. These results show statistically significant differences across the coefficients for the WVS cultural distance, demographic distance, knowledge distance, administrative distance, financial distance, geographic distance, and political distance dimensions. In addition, models with our distance dimensions represent an improvement over models that incorporate Hofstede's distance measures, considering the explained variance and in improvements in model fit. Instead of exploring whether distance matters to firm foreign expansion decisions by using an aggregate measure of distance, our results, which use our multidimensional measures of cross-national distance, consider how and why disaggregated dimensions of distance that derive from different country business, governance, and innovation systems can differentially affect firm foreign expansion decisions.

DISCUSSION AND CONCLUSION

In this paper we have proposed a new approach to conceptualizing, measuring, and examining the influence of cross-national distance. Instead of relying on the widely used Hofstede approach and measures of cultural distance, we have used

institutional theories of national business, governance, and innovation systems to ground our conceptual definitions, analysis, and choice of empirical dimensions and indicators. Based on these theories, and on recent institutional theorizing in international business (Jackson & Deeg, 2008; Pajunen, 2008), we have identified nine dimensions of distance: economic, financial, political, administrative, cultural, demographic, knowledge, connectedness, and geographic. Moreover, we have developed empirical indicators for each distance dimension based on the literature. Instead of using the Euclidean method to calculate dyadic distances between pairs of countries, we have used the Mahalanobis approach to handle the relatively high correlations between the indicator variables in all cross-national research, and the different scales on which they are measured. Finally, we have calculated all measures over time, and for twice as many countries as in previous research.

In order to assess the empirical validity and usefulness of our approach we have offered four separate empirical tests: the initial and sequential entry decisions of firms, the choice of manufacturing vs distribution subsidiaries, the choice between high- and low-income host countries, and the choices of high and low R&D-intensive firms as they expand into foreign countries. Through these examples, which consider several different foreign entry choices by US companies, we have shown how the inclusion of a broader set of distance dimensions increases our understanding of the influence of cross-national distance on firm foreign entry decisions. When we considered cultural distance alone (based either on our time-varying measure using the WVSs data or on Hofstede's cultural distance measures), we found that cultural distance significantly dissuades firms from investing in foreign countries. However, when we considered culture as one of many distance dimensions that can influence different types of foreign investment decisions by firms, we found both culture and our other distance dimensions to have differential effects. These results show not only the limitations of using a distance variable that is based exclusively on a cultural dimension, but also the importance of considering multiple dimensions of distance when analyzing the influence of cross-national distance across a range of research questions. We have shown opposite effects for our culture, political, administrative, demographic, and geographic distance dimensions across our four empirical examples. These results illustrate how distance can differentially affect firm foreign investment decisions. While prior research has shown that distance matters, our example shows how different distance dimensions can be used to examine how, why and when cross-national distances influence managerial decisions. Our illustration of this more nuanced approach to considering distance can allow researchers to consider how several different aspects of cross-national distance influence managerial decisions.

We hope that the multidimensional approach and data offered in this paper will spur more finely grained studies of the impact of distance on various managerial, organizational, and business variables. Moreover, we hope that our multidimensional approach will help researchers use distance measures that match their research questions. For instance, students of venture capital may prefer to use administrative and financial distance when it comes to understanding cross-national patterns of investment in ventures, whereas questions regarding human research management or consumer choice may be more readily answered using economic, cultural, and demographic distance measures. Our empirical results highlight significant differences across several of our distance dimensions in the four different research issues that we have explored empirically in this paper. Perhaps our approach can help resolve some of the inconsistencies reported in the literature concerning the effects of distance on foreign entry mode choice, firm performance, and human resource practices, given that each of these questions may possibly require the use of different dimensions and measures of distance.

The approach and data offered in this paper are also appropriate for conducting research on issues that transcend the topic of the international expansion of the firm. Cross-national distance also affects decisions by governments to establish different types of economic, financial or political relationships with other countries. It is also possible to think about conflict – or the potential for conflict – in terms of cross-national distance and its evolution over time. Thus our approach and data lend themselves to the examination of questions having to do with international relations, geopolitics, and international economics. In sum, an institutional approach to cross-national distance offers multiple avenues for future research, not only across the various management subfields but also across the larger social sciences.

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NOTES

[1]See Appendix 1 at http://lauder.wharton.upenn.edu/ciber/faculty_research.asp for more information about the specific questions from the WVSs that we used.

[2]Because the great circle distance is already a dyadic distance, we do not convert it into Mahalanobis distance (see below).

[3]See Appendix 2 at http://lauder.wharton.upenn.edu/ciber/faculty_research.asp for more information about calculating Euclidean and Mahalanobis distances.

[4]In Table 7 we show the results when comparing models that incorporate Hofstede as the main distance variable vs models that include our cross-national measures of distance. In results not reported below we also compared models that incorporated Hofstede's cultural variable in place of our WVS cultural distance variable, and consistently got improved model fit and higher *R*-squared values when incorporating our additional dimensions of cross-national distance in the models. Our comparison of "nested models" below therefore compares a model having a limited conception of distance (using Hofstede's measure) with a model that incorporates our expanded notion of cross-national distance.

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