Competitive paper
Track: 7. Clusters, location and local linkages

ICT Development and the Regional vs. Global Strategies of Multinational Enterprises

ABSTRACT

This paper examines how the development of information and communication technology (ICT) affects the spatial distribution of foreign direct investment. We find that ICT advances in the home country have no impact on the negative role of distance for outward FDI while ICT development in host countries enables multinational enterprises to pursuit a more globally dispersed strategy.

Keywords: ICT, FDI, Trade, location choices

1. Introduction

Historically, the degree of global integration has been shaped by the costs of coordinating economic activities over long distance and the emergence of new technologies that reduce the costs of conducting business over long distance. Modern information and communication technology (ICT), as a result of its distinct function in reducing communication costs, has had a profound impact on the strategic role of distance associated with international business (Kotabe and Mandiviwalla, 2005). For instance, burgeoning international transactions, facilitated and even transformed by the twin processes of digitalization and globalization, have led scholars to posit a thesis proclaiming the "death of distance" (Cairncross, 1997). Conversely, it has been argued that distance still matters (Ghemawat, 2001). Morgan (2004) also warned of the difference between cyberspace and geographic space for international business.

Related to this discussion is the impact that ICT development has had on the regionalization versus globalization debate associated with multinational enterprises (MNEs). If ICT has indeed reduced the negative impact of geographic distance, one could argue that FDI activities should be more dispersed than before. In support of this line of reasoning, using macro-level FDI stock and flow data, Dunning, Fujita, and Yakova (2007) find that the majority of FDI from non-European countries have become more geographically dispersed and the shares of inward and outward FDI stocks outside home regions have increased since the 1990s. In sharp contrast, Rugman and Verbeke (2004, 2007) have challenged the globalization argument with their finding that the world's largest 500 MNEs, accounting for over 90% of the world's stock of FDI, tend to have their sales unevenly distributed across the globe, usually concentrated in one geographic region. In other words, they contend that the scope and pervasiveness of globalization rhetoric may have been vastly exaggerated due to the higher cost of inter-regional versus intra-regional expansion. In similar

fashion, using bilateral trade data between OECD countries, Leamer and Storper (2001) demonstrate that, except for a small number of products, long-distance and neighborhood trade between 1970 and 1985 grew at similar rates. Their conclusion suggests that geographic proximity remains an important source of international competitiveness and that the volume of trade declines rapidly with distance between countries. Grosse and Trevino (1996) also find a significant and negative relationship between geographic and cultural distance for FDI into the United States, providing support for the "distance still matters" theory.

The purpose of this paper is to shed some light on the regionalization versus globalization debate by evaluating the impact of ICT development on the spatial dispersion of FDI activities. In line with this objective, the contribution of this research to extant literature is threefold. First, we argue that the implication of ICT development for a source country is different from that for a host country. For instance, advances in ICT in a source country will tend to reduce the overall communication cost for FDI but not the distribution of outward FDI because the relative cost of doing business with a geographically proximate and a geographically distant country remain the same. Conversely, ICT development increases the ability of a host country to attract FDI over long distances and hence increases the dispersion of FDI activities. Second, due to different levels of tacit knowledge for FDI between developed countries and for FDI between developed and developing countries, we hypothesize that ICT has a smaller impact on FDI between OECD countries than between OECD and non-OECD countries. Our rationale is that modern technology has not eliminated the strong role of geographical proximity for international transactions that require complex face-to-face communications, trust, and perhaps even a common culture. Third, our empirical analysis is one of the first that employs a gravity equation to investigate the impact of ICT on FDI activities. Our model encompasses cultural, administrative, geographic, and economic

distance (e.g. CAGE model) as suggested by Ghemawat (2001). We use both (fixed and wireless) telephone density and internet host density as proxies for ICT development. To test the robustness of our results, we use both the Hofstede and GLOBE national culture values in our investigation. Our empirical evidence supports the hypothesis that only ICT development in a host country can increase the geographic dispersion of FDI, although the finding for a different impact of ICT on FDI between OECD countries and for FDI between OECD and non-OECD countries is mixed.

The paper is organized as follows: The hypotheses are developed in section 2, the empirical model and the results are provided in section 3, and the paper is concluded in section 4.

2. Theoretical Framework

The liability of distance has been explicitly or implicitly embedded in the traditional theory of the MNE (Buckley and Casson, 1976; Caves, 1982 and 1996; Rugman, 1981, Zaheer, 1995). Since distance increases transaction cost, cultural incongruity, and investment uncertainty, regional orientation has been the default strategy for MNEs within which to deploy and exploit their firm-specific assets. The development of ICT, however, has greatly reduced communication costs, encouraged culture convergence, and facilitated information flows. As a result, ICT development may help to reduce the negative role of distance on FDI. In fact, using a sample of 88 organizations in the computer product industry, Andersen and Foss (2005) find that computer mediated communication has a positive on the ability of MNEs to coordinate their activities. This increased ability to communicate internationally, it is found, actually enhanced multinational performance. However, it should be pointed out that FDI is only one of myriad modes of operation that companies can employ at the global level. By considering alternate modes of serving foreign markets and the relative cost of communications, we argue that the development of ICT in a source

country has no impact on the geographic dispersion of FDI while the development of ICT in a host country should increase the spatial dispersion of FDI.

2.1 ICT development in a source country

Firms internationalize their operations for a variety of reasons, including market seeking, factor cost reduction, and knowledge enhancement. At least for firms who internationalize in search of new markets, and even for those who venture abroad to acquire greater knowledge, an important motivation of such FDI is to better serve actual and potential customers located in a foreign market. In fact, Nachum and Zaheer (2002) find that ICT development reduces the need for local presence, and in turn reduces the requirement that firms use FDI as the only means by which to serve foreign markets. For instance, in today's globalized environment, companies can use information directly gathered from websites to gain knowledge of their customers near or far. In addition, improved monitoring and communicating capabilities resulting from remote electronic access make it less important for a company to use FDI as a way to access production resources available in a foreign location (Zaheer and Manrakhan, 2001). As pointed out by Sambharya, Kumaraswamy, and Banerjee (2005), the development of ICT allows MNEs to focus on their core competencies and to outsource peripheral activities to low-cost providers. This strategy has been referred to "do what you do best and outsource the rest." Extended to the present study, this line of reasoning suggests that ICT advances in the home country will encourage internationalization via arms length transactions such as trade and licensing, but not necessarily through internalized transactions such as FDI.

Additionally, the development of ICT in the home country but not the host country would not impact the relative communication cost between home country firms and foreign markets

located at different spatial distances. The reason why is because electronic communication requires comparable technological deployment at both ends. Given the level of ICT development in foreign markets, ICT advances occurring in the source country will either lower the overall communication cost to all foreign markets at the same rate or have no impact on communication costs at all. Consequently, the distribution of outward FDI activities, and hence the negative role of distance on FDI, will not be affected. As such, we posit:

> *Hypothesis 1. ICT development in a source country has no impact on the negative role of distance on FDI.*

2.2 ICT development in a host country

We expect that ICT development in the host country would have a different impact on the negative role of distance for FDI than ICT development in the home country. First, ICT may increase the likelihood a given host country will be selected as the ultimate FDI location. In a study of U.S. MNC location patterns, Wheeler and Mody (1992) find that infrastructural quality in the host country is one of the most statistically significant factors determining FDI inflows. Compared to exporting and licensing, a decision to undertake market-seeking FDI requires a consumer base of sufficient critical mass to support the high level of resource commitment. A foreign country with a well developed communication infrastructure can lead to a larger market potential because consumers and suppliers are well connected via electronic networks. As a result, the cost associated with great geographic distance between a home and a foreign market can be offset by the lower cost of doing business within the foreign market.

Second, ICT development in a host country can effectively change the relative communication cost between an FDI source country and its foreign destinations at varying spatial distances. Ceteris paribus, ICT development, especially via the internet, allows a country to take a more proactive role

in interacting with the rest of the world. According to Rangan (2000), a major impediment to international transactions is the search and deliberation costs associated with new exchange partners over long distances. Distance not only makes it difficult to identify new opportunities but also costly to assess the capabilities and reliability of a new partner. In particular, recent research demonstrates that FDI location choice often follows a sequential model by focusing on a small number of countries first and then deliberating over regional alternatives through successive rounds of elimination (Chang, 1995). Therefore, ICT development will increase the possibility that a country will be included in the first round screening and, in turn, the likelihood that it will be selected as the FDI destination in the second round. In sum, we posit that

> *Hypothesis 2. The ICT development in a host country encourages inward FDI by reducing the negative role of distance.*

2.3 ICT development and tacit knowledge transfer

As mentioned, one of the motivations associated with outward FDI is knowledge seeking (Kogut and Zander, 1993). Following the initial term proposed by Polanyi (1966), knowledge can be categorized into two dimensions: tacit and explicit knowledge. Explicit knowledge is easy to communicate while tacit knowledge is abstract and can be transferred only through active involvement of humans because it can neither be written in manuals nor codified in formulas. Given its intangible nature, effective learning of tacit knowledge tends to require more face-to-face interactions. Indeed, "context," or cues and other information that are embedded in the social situation implies that certain types of communication can only be understood by those involved in the situation (Hall, 1976); these types of communication can only be effectively understood through human interaction. Because modern communication technology has limited capacity to transfer tacit knowledge, Leamer and Storper (2001) suggeste that ICT may help to replace routine

communications associated with standardized tasks, but that complex, unfamiliar, and innovative activities still require geographic closeness and a common cultural background.

Concomitantly, effective transfer of tacit knowledge depends heavily on recipients' absorptive capacity (see Tang and Koveos, 2008a). Using a sample of 32 MNEs in the pharmaceutical and electronics industries, Kuemmerle (1999) find that 76% of these companies' overseas laboratories were located in only five developed countries, namely the U.S., U.K., Japan, Germany, and France. In addition, due to weak intellectual property protection, and in order to minimize the knowledge spillover effect, Lee and Mansfield (1996) find that MNEs in developing countries have fewer R&D facilities. In fact, Nachum and Zaheer (2005) use average compensation per employee and R&D intensity of affiliates to measure the level of knowledge-seeking FDI in an industry. Given that industrial countries have higher wages and R&D expenditures, we believe that FDI between OECD countries is likely to contain more tacit knowledge than FDI between OECD and non-OECD countries. As such, we posit that the impact of ICT on reducing the negative role of distance is smaller for FDI between OECD countries than for FDI between OECD and non-OECD countries. That is,

> *Hypothesis 3. The ICT development in a host country has a smaller impact on the negative role of distance for FDI between OECD countries than for FDI between OECD and non-OECD countries.*

3. The Empirical Model

3.1 ICT development in Scandinavian and other European countries

To motivate the empirical study, we first conduct a simple comparison between three Western European countries: France, Germany, and the U.K. and three Scandinavian countries: Denmark, Finland, and Sweden. For illustration purpose, we consider bilateral FDI from the U.S.

and Japan to these six European countries, all of which are geographically close to each other yet differ substantially in ICT development. As can be seen in Table 1, the six European countries experienced rapid growth in teledensity, the combined fixed and wireless phones per 100 residents.[1] Given that there were virtually no cell phones in 1980, the growth in teledensity was mainly driven by wireless technology from 1980 to 2000. Meanwhile, Table 1 indicates that the Scandinavian group had higher phone density than the three largest economies in Europe in both 1980 and 2000. In addition, internet density, or the number of internet hosts per 100 residents, was much higher in the Scandinavian countries. In 2000, Finland had more than 10 internet hosts per 100 residents whereas France had less than 2. While all of them are OECD countries, the ICT development is more advanced in Scandinavian countries than it is in France, Germany, or the U.K.

To relate ICT development to FDI, bilateral FDI stocks from the U.S. and Japan to the six European countries are presented in the last column of Table 1. Although the volume of inward FDI to the Scandinavian countries remained low in 2000, due to their smaller economic size, their growth rates are impressive. For instance, FDI stock from Japan to the Scandinavian group increased tenfold or more from 1980 to 2000 while FDI stock from Japan to Germany and the U.K only increased by about four times and from Japan to France by about eight times during the same time period. Even with higher cultural, economic, and administrative distance, the growth of FDI stock from the U.S. to Sweden still exceeded the growth of FDI stock from the U.S. to the U.K., which increased eleven and eight times respectively between 1980 and 2000. Since many factors also contribute to the growth of inward FDI flows, we will proceed to conduct a more comprehensive test to discern how ICT development has changed the role of distance for bilateral

[1] The numbers in parentheses in Table 1 are for 1980.

FDI activities by controlling for cultural, administrative, geographic and economic distance between two countries.

3.2 Descriptive statistics of dependent and independent variables

The dependent variable we use for this study is the log of inward FDI stock, at least one side of which involved an OECD country from 1980 to 2000. The bilateral FDI statistics are from the International Direct Investment database published annually by the OECD.[2] As listed in the Appendix, there are a total of 35 countries in our sample composed of 21 OECD countries and 14 non-OECD countries. The panel nature of this data set allows us to explore how the development of ICT has changed the spatial distribution of FDI over time by controlling for other related factors.

The first independent variable we are interested in is the log of distance in kilometers between the capital cities of two countries. Following the logic of Newton's gravity equation, the farther away the two countries are, the higher the costs of international commerce and hence the less FDI. Therefore, the coefficient on the distance variable should be negative. The focus of this paper is to examine how ICT has affected the negative role of distance on FDI. To measure ICT development, we use both teledensity and internet density as the technology proxy. In addition, we interact the ICT variables with geographic distance. According to hypotheses 1 and 2, we expect the sign on the interaction term to be insignificant for the source country while significant and positive for the host country. In order to test hypothesis 3, we create an OECD country dummy and interact the dummy variable with the ICT and distance variables. We expect the coefficient on the triple interactive term, *logICT x log Distance x OECD*, to be negative. The ICT variables are from

[2] The data is available at www.sourceoecd.org.

the *World Telecommunications Indicators* published annually by the International Telecommunications Union (ITU).[3]

The first set of control variables we use in this study are the source and host country's economic size, or the log of GDPs. As Newton's gravity equation stipulates, the attraction between two objectives, or bilateral FDI activity in our paper, is positively related to the mass of the two objectives or the economic size of two countries. Under similar rationale, the log of population in the source and the destination country are included as another set of control variables. Conditional on GDP, the coefficients on the log of population pick up the inverse effect of GDP per capita. That is, a negative sign on the source country's population indicates that a rich country is more likely to be the origin of FDI while a negative sign on the host country's population suggests that FDI is positively related to a destination country's income level. Both the GDP and population data are taken from ITU's *World Telecommunications Indicators* database.

In order to control for the impact of cultural distance on FDI, we use the four work related values developed by Hofstede: individualism, power distance, uncertainty avoidance, and masculinity. In response to the critique by Shenkar (2001) regarding issues associated with the composite cultural distance proposed by Kogut-Singh (1988) and extended by Grosse and Trevino (1996), we use the net difference between two countries' cultural scores along each dimension. Moreover, considering the directional and non-linear effect of each cultural dimension on FDI (Tang, 2009), we also include the square terms of the net difference in individualism, power distance, uncertainty avoidance, and masculinity. To test the robustness of our results, we replace Hofstede's cultural scores with the corresponding GLOBE indices (House, Hanges, Javidan, Dorfman, and Gupta, 2004).

[3] Available at www.itu.org.

Other control variables include openness to FDI, which measures a destination country's overall inward FDI as a percentage of its GDP. The data was collected from the World Bank's *World Development Indicators*. To account for possible endogeneity, the openness measure from the previous year is used in our regression analysis. Everything else held constant, a better investment environment will encourage more inward FDI to a country. To control for administrative distance, we use a dummy variable that indicates whether a host and source country have an agreement on taxation of income and capital for a particular year. The information was collected from online publications provided by Oceana Publications[4]. In addition, we use Henisz's political constraints index to control for the political environment of a host country.[5] This index estimates how easily a country's government policy can be changed, given its political and legislative structure, and it is arguably a better measure of a host country's political risk given its forward-looking nature. Finally, the empirical model also controls the impact of the host country's corporate tax rate on FDI. The data for the top corporate tax rate in a host country is taken from the World Tax Database compiled by the University of Michigan's Office of Tax Policy Research (OTPR).[6]

The descriptive statistics and the correlation matrix of independent and dependant variables are reported in Table 2. Due to space constraints, the cultural distance variables are not shown in the table but are available upon request. With more than 10,000 observations, most correlation coefficients appear to be statistically significant. Nonetheless, except for the correlations between GDP and population, all correlation coefficients are below 0.5. In other words, there is no serious co-linearity concern with our OLS regressions.

[4] Available at www.oceanalaw.com
[5] Available at http://www-management.wharton.upenn.edu/henisz
[6] Available at http://www.bus.umich.edu/otpr/otpr/introduction.htm

3.3 The estimation results

Table 3 presents our results for bilateral FDI stock using the cultural distance based on Hofstede's scores. Regression results in columns 1-3 use teledensity as the proxy for ICT development and results in columns 4-6 are based on internet density. Because the commercial application of the internet did not begin until the 1990s, regressions in columns 4-6 only cover the time period from 1990 to 2000. For each group, we begin with a traditional gravity model without ICT variables: columns 1 and 4. We augment the model by including the source and destination country's telephone density and the interaction terms of ICT and distance in columns 2 and 5. Finally, the interaction terms of ICT, distance, and OECD dummy variable are included in columns 3 and 6.

As expected, distance is always negatively and significantly related to FDI. That is, the farther away two countries are, the less bilateral FDI activities. Nonetheless, the magnitude of the coefficient on distance increases slightly once teledensity is included while it decreases when internet density is added to the regression. In addition, the coefficients on the interaction term of a source country's ICT and distance are always statistically insignificant, which confirms hypothesis 1 that a source country's ICT development has no impact on the geographic distribution of FDI. In contrast, the coefficients on the interaction term of a host country's ICT and distance are all positive and significant in columns 2 and 6, which confirms hypothesis 2 that host country's ICT development will reduce the negative role of distance on FDI. The difference in regression results emerge when the triple interaction term is included: the coefficient on $logICT_{dest}$ *xlogDistance x OECD* is negative but insignificant in the teledensity equation while it is positive and significant in the internet density equation. In other words, hypothesis 3 is not confirmed and we can not find

evidence that ICT development in a host country has a smaller impact on FDI between OECD countries.

In Table 4, we replace the Hofstede cultural scores with the GLOBE practices-based cultural indices. The main reason why is due to the concern of cultural changes driven by economic development (see Tang and Koveos, 2008b) since the Hofstede cultural indices were developed in the 1970s. Comparing Table 4 with Table 3, we find very little difference. The only exception is that the coefficient on $logICT_{dest}$ *xlogDistance x OECD* in the internet density equation becomes statistically insignificant in Table 4. In other words, hypotheses 1 and 2 are confirmed with GLOBE practices-based cultural scores but we still cannot find support for hypothesis 3.

The GLOBE values-based cultural scores are used to derive the regression results found in Table 5. The results are very similar to Tables 3 and 4 with one exception. The coefficient on $logICT_{dest}$ *xlogDistance x OECD* becomes negative and significant in the teledensity equation, which is consistent with hypothesis 3. This is the only case in which we find support for hypothesis 3.

Other control variables in general have the expected signs. The coefficients on both the source and host country's GDP are positive and significant. The sign on the host country's population is mostly insignificant while it is negative and significant for source countries. These results suggest that FDI tends to originate from rich countries but that it does not always go to rich countries. In addition, both the level of openness and bilateral tax treaties encourage FDI while political risk discourages FDI. Corporate income tax does not appear to be a significant determinant of FDI in our study as the coefficients on *Tax* are mainly insignificant.

Finally, although there are significant conceptual and methodological difference between the Hofstede and GLOBE studies (Tang and Koveos, 2008b), the impact of cultural distance, derived

from these two studies, on bilateral FDI are remarkably similar. In particular, the quadratic term of GLOBE's practices-based masculinity index and values-based uncertainty avoidance index are not significant, which confirms that the direction of cultural distance matters (Tang, 2009).

To examine how non-technology factors have affected bilateral FDI activities, we also include a time trend and the interaction of the time trend and distance in Tables 3-5. It is interesting that the coefficient on the time trend is positive when the internet density is used as the proxy for ICT development. Consistent with common observations, this finding confirms that bilateral FDI activities have increased in the 1990s. However, the sign of the time trend-distance interaction term is negative and significant. This suggests that FDI would have become more "regional" in the past decade if ICT development had not reduced the negative impact of distance on MNEs. This finding, to some extent, balances the debate on the regional versus global strategy of MNES and provides further evidence regarding the importance of ICT development to bridge the geographic distance between a host and a source country.

4. Managerial Implications and Concluding Remarks

This paper examines how the development of ICT has reshaped regional versus global strategies of MNEs by reinterpreting the impact of distance on FDI. We find that technological advances in a country increase its ability to attract inward FDI from greater distances but do not change the spatial distribution of its outward FDI. Although the rhetoric promoting the "death of distance" appears to be an exaggeration, modern information technology has increased the possibility for a country to be chosen as a direct investment destination. Nonetheless, the extent to which ICT can replace traditional face-to-face communication remains debatable. Even with the assumption that ICT has limited capacity in handling tacit knowledge, we can not find support that

ICT has a smaller impact on FDI between developed countries, where the content of tacit knowledge should be higher than that associated with FDI between developed and developing countries. This finding implies that the development of modern communication technology is equally important for developed and developing countries. ICT has become the backbone of the increasingly globalized business environment by providing seamless supply chain, operations, human resource, and service management systems. The case of Scandinavian countries offers a prime example as rapid development of ICT in those countries has transformed the original fragmented markets of countries in that region into an integrated market that makes them more attractive to foreign investors.

Even though ICT can not totally replace face-to-face communications and business travel, it has created a network to connect people from different corners of the world. In particular, as pointed out by Morgan (2004), geographic proximity does not automatically translate into organizational proximity. ICT may actually provide a new mechanism for communications across organizational boundaries because information has become searchable, retrievable, and storable. More importantly, an impersonal email sometimes can go a longer way toward breaking the ice than an office visit. On the other hand, as the development of ICT reduces the need for face-to-face communication, businesses are more likely to develop a "technological" relationship over a personal relationship in today's business environment. A transaction can be completed without firms' knowing the age, gender, ethnicity, and personal preferences of customers and colleagues. The convenience of technology may lead to more short-term behaviors and under investment in long-term relationship building. Future research can investigate how ICT has changed the pattern of communication and organizational behaviors inside a multinational company.

Another important implication of this paper is the impact of ICT on business agglomeration. Without advances in ICT, the agglomeration forces to localize business would have been stronger due to the shift from standardized to specialized, customized, and innovative production (Nachum, 2000) that prefers more face-to-face communications and business clusters. However, ICT development provides incentives for firms to continue to turn complex and innovative processes into standardized production so that the products can be shipped and produced in low-cost locations. Consequently, in the Internet age, de-agglomeration and agglomeration will coexist and continue to evolve over time. That is why not only economic, political, and cultural forces but also technological factors can shape the new economic geography today. The paper suggests that firms need to develop a multi-dimensional distance measure when making FDI location choice, one that includes not only geographic and cultural distance but one that accounts for the moderating impact of ICT on these traditional distances. As the pace of ICT development varies across countries, we have to continue to update the strategic map and reorganize global business accordingly.

Table 1: FDI from U.S. and Japan to Europe: Western Europe vs. Scandinavian Group

FDI Source Country	FDI Host Country	Host Country Teledensity 2000 (1980)	Host Country Internet Density 2000 (1980)	Bilateral Inward FDI Stock in Trillion $ 2000 (1980)
	A. Western Europe			
U.S.	France	107.2 (29.5)	1.9 (0)	39.1 (6.9)
	Germany	119.7 (33.2)	2.48 (0)	53.6 (12.7)
	UK	131.6 (32.2)	2.8(0)	233.4 (26.7)
Japan	France	107.2 (29.5)	1.9 (0)	3.3 (0.4)
	Germany	119.7 (33.2)	2.48 (0)	4.4 (1.1)
	UK	131.6 (32.2)	2.8(0)	23.2 (0.6)
	B. Scandinavian group			
U.S.	Denmark	135.1 (43.4)	6.26 (0)	5.6 (1.09)
	Finland	127 (36.89)	10.21 (0)	1.3 (0.2)
	Sweden	139.9 (58)	6.71 (0)	11.3 (1.0)
Japan	Denmark	135.1 (43.4)	6.26 (0)	0.2 (0.02)
	Finland	127 (36.89)	10.21 (0)	0.2 (0)
	Sweden	139.9 (58)	6.71 (0)	1.5 (0.03)

Note: Teledensity refers to total fixed and wireless telephones per 100 residents. Internet density is the number of internet hosts per 100 residents.

Table 2. Summary Statistics and Correlation Matrix

A. Summary Statistics	Mean	Std. Dev.	Min.	Max.	# of observations
1. logFDI	5.09	2.95	-4.83	14.20	11,908
2. logGDP	5.25	1.35	2.46	9.21	21,470
3. logPOP	17.03	1.31	14.70	20.73	21,714
4. logdistance	8.71	0.91	5.46	9.90	21,714
5. teledensity	40.78	29.73	0.24	139.9	21,448
6. internet density	0.65	2.08	0	29.3	21,354
7. treaty	0.50	0.50	0	1	21,693
8. tax rate	36.63	9.27	9.8	60	21,714
9. political index	0.41	0.15	0	0.69	21,714
10. FDI openness	1.85	2.83	-2.99	24.60	21,714

B. Correlations	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. logFDI	1.00													
2. logGDP (host)	0.13***	1.00												
3. logGDP (source)	0.49***	-0.18***	1.00											
4. logPOP (host)	0.06***	0.68***	-0.07***	1.00										
5. logPOP (source)	0.15***	-0.06***	0.74***	0.00	1.00									
6. logdistance	-0.33***	0.02**	0.02**	0.20***	0.15***	1.00								
7. teledensity (source)	0.10***	0.33***	-0.06***	-0.30***	-0.07***	-0.16***	1.00							
8. teledensity (host)	0.40***	-0.07***	0.26***	-0.07***	-0.28***	-0.09***	0.30***	1.00						
9. treaty	0.27***	0.07***	0.12***	-0.06***	-0.00	-0.20***	0.18***	0.14***	1.00					
10. internet (source)	0.10***	0.21***	0.01	-0.03***	-0.02**	0.03***	0.57***	0.29***	0.07***	1.00				
11. internet (host)	0.21***	0.01	0.17***	-0.01	-0.04***	0.05***	0.28***	0.58***	0.09***	0.25***	1.00			
12. tax	-0.09***	0.04***	-0.16***	0.10***	-0.01	-0.06***	-0.18***	-0.31***	0.05***	-0.16***	-0.20***	1.00		
13. political	0.03***	0.14***	0.02**	-0.11***	-0.04***	-0.17***	0.25***	0.08***	0.13***	0.07***	0.04***	-0.16***	1.00	
14. openness	0.10***	-0.17***	0.08***	-0.31***	-0.01	0.03***	0.39***	0.34***	0.04***	0.33***	0.27***	-0.25***	-0.12***	1.00

Note: the number of observations for the correlation matrix is 10,874. ***, ** significant at 1% and 5% level.

Table 3. ICT and Bilateral FDI Stocks with Hofstede's Cultural Distance

	Fixed + Wireless Phones (1980-2000)			Internet Hosts (1990-2000)		
	(1)	(2)	(3)	(4)	(5)	(6)
$logGDP_{host}$	0.454***	0.664***	0.600***	0.461***	0.418***	0.410***
	(5.04)	(6.69)	(5.92)	(4.97)	(4.46)	(4.38)
$logGDP_{source}$	1.996***	1.569***	1.521***	2.038***	1.979***	1.963***
	(23.39)	(17.24)	(16.00)	(22.03)	(21.41)	(21.21)
$logPOP_{host}$	0.040	-0.146	-0.047	0.017	0.037	0.047
	(0.47)	(-1.49)	(-0.46)	(0.19)	(0.43)	(0.55)
$logPOP_{source}$	-1.056***	-0.621***	-0.608***	-1.066***	-1.015***	-0.996***
	(-12.48)	(-7.09)	(-6.81)	(-11.75)	(-11.33)	(-11.04)
logDistance	-0.819***	-0.865***	-0.923***	-0.905***	-0.501***	-0.553***
	(-7.67)	(-5.79)	(-6.05)	(-5.85)	(-2.47)	(-2.72)
$logICT_{host}$		-0.062**	-0.042		-0.513***	-0.610***
		(-2.41)	(-1.52)		(-2.92)	(-3.29)
$logICT_{source}$		0.043	0.016		0.030	0.038
		(1.49)	(0.56)		(0.21)	(0.26)
$logICT_{host}$ x logDistance		0.006**	0.003		0.064***	0.070***
		(2.03)	(1.12)		(3.28)	(3.45)
$logICT_{source}$ x logDistance		-0.002	0.000		-0.001	-0.004
		(-0.66)	(0.08)		(-0.07)	(-0.22)
$logICT_{host}$ x logDistance x OECD			-0.001			0.008***
			(-1.11)			(2.68)
$logICT_{source}$ x logDistance x OECD			0.002***			0.002
			(2.47)			(0.61)
Time Trend	-0.052	0.020	-0.001	-0.011	0.244**	0.231**
	(-1.18)	(0.19)	(-0.01)	(-0.17)	(2.08)	(1.97)
Time Trend x log Distance	-0.001	-0.013	-0.009	0.003	-0.028**	-0.026**
	(-0.18)	(-1.06)	(-0.75)	(0.44)	(-2.11)	(-1.95)
Dind	-0.203***	-0.201***	-0.184**	-0.208***	-0.171**	-0.178**
	(-2.62)	(-2.60)	(-2.39)	(-2.64)	(-2.23)	(-2.31)
$Dind^2$	0.111***	0.104***	0.130***	0.119***	0.113***	0.126***
	(4.41)	(4.15)	(5.05)	(4.56)	(4.37)	(4.73)
Dpdi	-0.039	0.001	0.026	-0.081	-0.092	-0.090
	(-0.54)	(0.01)	(0.37)	(-1.11)	(-1.28)	(-1.25)
$Dpdi^2$	-0.134***	-0.121***	-0.106***	-0.128***	-0.130***	-0.125***
	(-5.35)	(-4.81)	(-4.20)	(-5.21)	(-5.33)	(-5.11)
Duai	-0.243***	-0.205***	-0.182***	-0.288***	-0.286***	-0.292***
	(-4.08)	(-3.49)	(-3.05)	(-4.86)	(-4.86)	(-4.93)

$Duai^2$	-0.078***	-0.079***	-0.079***	-0.063**	-0.051*	-0.052*
	(-2.49)	(-2.58)	(-2.61)	(-2.20)	(-1.79)	(-1.82)
Dmas	-0.124***	-0.049	-0.023	-0.105**	-0.102**	-0.102**
	(-2.62)	(-1.02)	(-0.47)	(-2.18)	(-2.14)	(-2.14)
$Dmas^2$	-0.059***	-0.063***	-0.067***	-0.068***	-0.063***	-0.063***
	(-3.00)	(-3.27)	(-3.46)	(-3.37)	(-3.14)	(-3.18)
$OpenFDI_{host}$	0.155***	0.134***	0.138***	0.126***	0.116***	0.117***
	(10.63)	(8.16)	(8.25)	(9.02)	(7.88)	(7.89)
Treaty	0.718***	0.689***	0.638***	0.752***	0.697***	0.689***
	(4.89)	(4.72)	(4.33)	(5.06)	(4.72)	(4.66)
Tax	-0.007	-0.012*	-0.016**	-0.004	-0.005	-0.006
	(-1.06)	(-1.75)	(-2.30)	(-0.38)	(-0.44)	(-0.54)
Political	-1.664***	-1.769***	-1.757***	-1.566***	-1.380***	-1.398***
	(-3.79)	(-4.08)	(-3.98)	(-3.18)	(-2.80)	(-2.82)
Constant	16.491***	13.868***	13.117***	16.087***	12.147***	12.162***
	(10.16)	(8.40)	(8.01)	(8.52)	(5.66)	(5.66)
No. of observations	11,379	11,217	11,217	7,377	7,034	7,034
F Statistics	136.24	124.15	121.08	115.32	100.50	94.48
R-square	0.556	0.568	0.573	0.570	0.574	0.575

Note: Numbers in parentheses represent t-statistics. *, **, *** significant at the 10%, 5%, and 1% level, respectively.

Table 4. ICT and Bilateral FDI Stocks with GLOBE's Practices-Based Cultural Distance

	Fixed + Wireless Phones (1980-2000)			Internet Hosts (1990-2000)		
	(1)	(2)	(3)	(4)	(5)	(6)
$logGDP_{host}$	0.745***	0.825***	0.748***	0.728***	0.684***	0.679***
	(7.40)	(7.37)	(6.56)	(6.87)	(6.43)	(6.37)
$logGDP_{source}$	1.784***	1.423***	1.442***	1.903***	1.848***	1.837***
	(18.55)	(14.03)	(13.78)	(18.78)	(18.42)	(18.19)
$logPOP_{host}$	-0.240***	-0.317***	-0.213*	-0.238***	-0.214**	-0.205**
	(-2.54)	(-2.94)	(-1.91)	(-2.51)	(-2.27)	(-2.16)
$logPOP_{source}$	-0.810***	-0.418***	-0.456***	-0.878***	-0.836***	-0.824***
	(-8.65)	(-4.13)	(-4.38)	(-8.88)	(-8.60)	(-8.35)
logDistance	-0.758***	-0.856***	-0.885***	-0.783***	-0.329	-0.361*
	(-6.89)	(-5.52)	(-5.65)	(-5.01)	(-1.60)	(-1.75)
$logICT_{host}$		-0.053*	-0.032		-0.510***	-0.551***
		(-1.88)	(-1.06)		(-2.97)	(-3.11)
$logICT_{source}$		0.016	-0.009		-0.031	-0.048
		(0.49)	(-0.26)		(-0.22)	(-0.33)
$logICT_{host}$ x logDistance		0.005*	0.003		0.064***	0.066***
		(1.71)	(0.93)		(3.32)	(3.37)
$logICT_{source}$ x logDistance		0.001	0.003		0.007	0.007
		(0.25)	(0.87)		(0.43)	(0.43)
$logICT_{host}$ x logDistance x OECD			-0.001			0.004
			(-1.43)			(1.44)
$logICT_{source}$ x logDistance x OECD			0.002**			0.003
			(2.14)			(1.00)
Time Trend	-0.034	0.093	0.078	0.038	0.325***	0.316***
	(-0.76)	(0.83)	(0.70)	(0.57)	(2.72)	(2.64)
Time Trend x log Distance	-0.003	-0.022*	-0.019	-0.002	-0.038***	-0.036***
	(-0.59)	(-1.71)	(-1.52)	(-0.30)	(-2.79)	(-2.66)
Dind	0.003	0.093	0.107	0.066	0.016	0.017
	(0.03)	(0.85)	(0.97)	(0.59)	(0.15)	(0.16)
$Dind^2$	0.060	0.062	0.076**	0.077**	0.071*	0.080**
	(1.61)	(1.63)	(1.97)	(2.05)	(1.88)	(2.09)
Dpdi	-0.065	-0.064	-0.053	-0.119*	-0.106*	-0.106*
	(-1.10)	(-1.09)	(-0.90)	(-1.83)	(-1.64)	(-1.63)
$Dpdi^2$	-0.047***	-0.045**	-0.046***	-0.047**	-0.045**	-0.046**
	(-2.55)	(-2.42)	(-2.53)	(-2.43)	(-2.32)	(-2.37)
Duai	0.292***	0.284***	0.260***	0.300***	0.286***	0.286***
	(4.73)	(4.65)	(4.28)	(4.96)	(4.73)	(4.74)

$Duai^2$	-0.162***	-0.165***	-0.160***	-0.163**	-0.157***	-0.157***
	(-5.56)	(-5.61)	(-5.46)	(-5.83)	(-5.58)	(-5.59)
Dmas	-0.171***	-0.142***	-0.137***	-0.173***	-0.167***	-0.167***
	(-3.20)	(-2.61)	(-2.54)	(-3.05)	(-2.98)	(-2.97)
$Dmas^2$	-0.040	-0.048*	-0.052*	-0.028	-0.032	-0.034
	(-1.43)	(-1.75)	(-1.92)	(-0.98)	(-1.15)	(-1.23)
$OpenFDI_{host}$	0.139***	0.117***	0.120***	0.106***	0.096***	0.095***
	(9.64)	(6.93)	(7.06)	(7.45)	(6.30)	(6.22)
Treaty	0.536***	0.511***	0.483***	0.515***	0.452***	0.444***
	(3.56)	(3.45)	(3.26)	(3.37)	(2.99)	(2.92)
Tax	-0.005	-0.009	-0.012*	-0.004	-0.005	-0.006
	(-0.64)	(-1.31)	(-1.75)	(-0.42)	(-0.52)	(-0.61)
Political	-1.173***	-1.353***	-1.380***	-1.315***	-1.121**	-1.161***
	(-2.73)	(-3.16)	(-3.22)	(-2.81)	(-2.40)	(-2.47)
Constant	16.061***	13.036***	12.572***	15.567***	11.368***	11.379***
	(9.53)	(7.55)	(7.30)	(8.02)	(4.99)	(4.99)
No. of observations	11,379	11,217	11,217	7,377	7,034	7,034
F Statistics	148.37	127.34	118.98	120.77	106.45	99.02
R-square	0.559	0.571	0.573	0.571	0.576	0.577

Note: Numbers in parentheses represent t-statistics.*, **, *** significant at the 10%, 5%, and 1% level, respectively.

Table 5. ICT and Bilateral FDI Stocks with GLOBE's Values-Based Cultural Distance

	Fixed + Wireless Phones (1980-2000)			Internet Hosts (1990-2000)		
	(1)	(2)	(3)	(4)	(5)	(6)
$logGDP_{host}$	0.858***	0.982***	0.829***	0.889***	0.823***	0.813***
	(9.69)	(10.04)	(8.14)	(10.62)	(9.76)	(9.64)
$logGDP_{source}$	1.655***	1.289***	1.315***	1.700***	1.653***	1.642***
	(19.36)	(13.50)	(13.45)	(19.23)	(18.45)	(18.25)
$logPOP_{host}$	-0.122	-0.252**	-0.062	-0.134	-0.109	-0.098
	(-1.35)	(-2.41)	(-0.57)	(-1.55)	(-1.27)	(-1.14)
$logPOP_{source}$	-0.771***	-0.365***	-0.431***	-0.793***	-0.750***	-0.742***
	(-9.06)	(-3.76)	(-4.41)	(-8.84)	(-8.39)	(-8.21)
logDistance	-0.723***	-0.816***	-0.872***	-0.749***	-0.393**	-0.415**
	(-6.35)	(-5.22)	(-5.52)	(-4.72)	(-1.96)	(-2.07)
$logICT_{host}$		-0.087***	-0.040		-0.465***	-0.500***
		(-2.97)	(-1.30)		(-2.68)	(-2.74)
$logICT_{source}$		0.048	-0.009		0.052	0.033
		(1.54)	(-0.29)		(0.36)	(0.23)
$logICT_{host}$ x logDistance		0.009***	0.004		0.058***	0.060***
		(2.69)	(1.14)		(3.01)	(3.01)
$logICT_{source}$ x logDistance		-0.003	0.003		-0.001	-0.001
		(-0.77)	(0.80)		(-0.07)	(-0.04)
$logICT_{host}$ x logDistance x OECD			-0.002***			0.003
			(-2.47)			(1.15)
$logICT_{source}$ x logDistance x OECD			0.003***			0.002
			(3.82)			(0.91)
Time Trend	-0.061	0.070	0.058	0.022	0.248**	0.242**
	(-1.34)	(0.63)	(0.54)	(0.33)	(2.13)	(2.08)
Time Trend x log Distance	0.000	-0.019	-0.016	-0.000	-0.029**	-0.028**
	(0.07)	(-1.50)	(-1.33)	(-0.00)	(-2.19)	(-2.11)
Dind	-0.164***	-0.178***	-0.206***	-0.186***	-0.162***	-0.164***
	(-3.40)	(-3.42)	(-4.01)	(-3.30)	(-2.82)	(-2.85)
$Dind^2$	0.056**	0.062**	0.060**	0.073**	0.078***	0.076***
	(1.94)	(2.25)	(2.08)	(2.41)	(2.64)	(2.57)
Dpdi	0.091	0.070	0.074	0.076	0.085	0.087
	(1.54)	(1.17)	(1.23)	(1.21)	(1.39)	(1.42)
$Dpdi^2$	-0.055*	-0.058*	-0.070**	-0.033	-0.038	-0.039
	(-1.77)	(-1.86)	(-2.28)	(-1.04)	(-1.23)	(-1.28)
Duai	-0.267***	-0.162**	-0.105	-0.290***	-0.305***	-0.302***
	(-3.69)	(-2.20)	(-1.42)	(-4.09)	(-4.24)	(-4.20)

$Duai^2$	-0.037	-0.022	-0.009	-0.026	-0.028	-0.024
	(-1.47)	(-0.84)	(-0.34)	(-1.00)	(-1.08)	(-0.92)
Dmas	0.182***	0.151***	0.166***	0.220***	0.207***	0.207***
	(3.58)	(2.97)	(3.30)	(4.11)	(3.90)	(3.90)
$Dmas^2$	-0.101***	-0.097***	-0.099***	-0.105***	-0.096***	-0.096***
	(-5.04)	(-4.85)	(-5.11)	(-5.18)	(-4.72)	(-4.72)
$OpenFDI_{host}$	0.137***	0.119***	0.128***	0.101***	0.089***	0.089***
	(9.26)	(7.03)	(7.43)	(6.81)	(5.70)	(5.66)
Treaty	0.729***	0.699***	0.655***	0.791***	0.718***	0.712***
	(4.54)	(4.45)	(4.22)	(4.98)	(4.55)	(4.49)
Tax	-0.006	-0.012*	-0.018***	-0.001	-0.002	-0.002
	(-0.77)	(-1.68)	(-2.52)	(-0.09)	(-0.15)	(-0.24)
Political	-1.440***	-1.484***	-1.536***	-1.540***	-1.455**	-1.493**
	(-3.61)	(-3.67)	(-3.74)	(-3.44)	(-3.24)	(-3.30)
Constant	12.981***	10.397***	9.694***	11.833***	8.594***	8.582***
	(7.77)	(5.92)	(5.57)	(6.10)	(4.00)	(3.99)
No. of observations	11,379	11,217	11,217	7,377	7,034	7,034
F Statistics	127.02	117.52	112.12	109.66	96.10	88.69
R-square	0.548	0.562	0.571	0.565	0.570	0.570

Note: Numbers in parentheses represent t-statistics.*, **, *** significant at the 10%, 5%, and 1% level, respectively.

References:

Buckley, P. & Casson, M. 1976. *The Future of the Multinational Enterprise*. Macmillan: London

Cairncross, F. 1997. *The Death of Distance: How the Communications Revolution will Change our Lives*. Harvard Business School Press: Cambridge, MA.

Caves. R. 1982 &1996. *Multinational Enterprise and Economic Analysis*. Cambridge: Cambridge University Press. First and second editions.

Chang, S-J. 1995. International expansion strategy of Japanese firms: Capability building through sequential entry. *Academy of Management Journal* 38(2): 383-407

Chung, W., and Alcacer, J. 2002. Knowledge seeking and location choices of foreign direct investment in the United States. *Management Science* 48(12): 1534-1554

Davidson, W. 1980. The location of foreign direct investment activity: Country characteristics and experience effects. *Journal of International Business Studies* 11 (fall): 9-22

de la Torre, J. and Moxon, R. 2001. Introduction to the symposium E-commerce and global business: The impact of the information and communication technology revolution on the conduct of international business. *Journal of International Business Studies*: 32(4): 617-639

Dhanaraj, C., M. Lyles, H.K. Steensma, L. Tihanyi, 2004. Managing tacit and explicit knowledge transfer in IJVs: the role of relational embeddedness and the impact on performance. *Journal of International Business Studies* 35(5): 428-442

Dunning, J., 1980. Toward an eclectic theory of international production: some empirical tests, *Journal of International Business Studies* 11 (Spring/Summer): 9–31

_____, 1998. Location and the multinational enterprise: A neglected factor? *Journal of International Business Studies* 29(1): 45-66

Dunning, J., Fujita, M., & Yakova, N. 2007. Some macro-data on the regionalization/globalization debate: a comment on the Rugman/Verbeke analysis. *Journal of International Business Studies* 38(1): 177-199

Grimes, S. 2000. Rural areas in the information society: Diminishing distance or increasing learning capacity? *Journal of Rural Studies* 16: 13-21

Grosse, R. and Trevino, L.J. 1996. Foreign direct investment in the United States: an analysis by country of origin. *Journal of International Business Studies* 27(1): 139-155

Ghemawat, P.(2001) 'Distance still matters: The hard reality of global expansion', *Harvard Business Review* (September): 137–147

Hall, E.T. (1976) *Beyond Culture*, New York: Anchor/Doubleday.

House, R., Hanges, P., Javidan, M., Dorfman, P., and Gupta, V. (Eds.). (2004) *Culture, Leadership, and Organizations: The GLOBE Study of 62 Societies*. Thousand Oaks, CA: Sage.

Kogut, B. and Zander, U. 1993. Knowledge of the firm and the evolutionary theory of the multinational corporation. *Journal of International Business Studies* 24 (4): 625-645

Kogut, B., & Singh, H. 1988. The effect of national culture on the choice of entry mode. *Journal of International Business Studies* 19(3): 411-432.

Kotabe, M. and Mandviwalla, M. 2005. Information technology and international business: Theory and strategic development. *Journal of International Management* 11(2): 119-123

Kuemmerle, W. 1999. The drivers of foreign direct investment into research and development: an empirical investigation. *Journal of International Business Studies* 30(1): 1-24

Leamer, E. and Storper, M. (2001). The economic geography of the Internet Age. *Journal of*

International Business Studies 32(4): 641-665
Morgan, Kevin, 2004. The exaggerated death of geography: learning, proximity and territorial innovation systems. *Journal of Economic Geography* 4(1): 3-21
Nachum, L. and Zaheer, S, 2005. The persistence of distance? The impact of technology on MNE motivations for foreign investment. *Strategic Management Journal* 26: 747-767
Niederman, F, 2005. International business and MIS approaches to multinational organizational research: The case of knowledge transfer and IT workforce outsourcing. *Journal of International Management* 11(2): 187-200
Polanyi, M (1966) The Tacit Dimension, Doubleday and Co: Garden City, NY.
Rangan, S. 2000. Search and deliberation in international exchange: Microfoundations to some macro patterns. *Journal of International Business Studies* 31(2): 205-222
Rugman, A. 1981. *Inside the Multinationals: The Economics of Internal Markets*. Croom Helm: London
Rugman, A. & Verbeke, A. 2004. A perspective on regional and global strategies of multinational enterprises. *Journal of International Business Studies* 35(1): 3-18
_____. 2007. Liabilities of regional foreignness and the use of firm-level versus country-level data: a response to Dunning et al. *Journal of International Business Studies* 38(1): 200-2005
Sambharya, R., Kmaraswamy, A., and Banerjee, S, 2005. Information technologies and the future of the multinational enterprise. *Journal of International Management* 11(2): 143-161.
Shenkar, O. 2001. Cultural distance revisited: towards a more rigorous conceptualization and measurement of cultural differences. *Journal of International Business Studies* 32(3): 519-536.
Smith, P. 2002. Culture's consequences: Something old and something new. *Human Relations* 55(1): 119-135
Sweeney, G.P. 1987. Innovation, Entrepreneurs, and Regional Development. Frances Pinter, London
Tsurumi, Y. 1976. *The Japanese Are Coming: A Multinational Spread of Japanese Firms*. Cambridge, MS: Ballinger
Tang. L, *2009.* The direction of cultural distance on FDI: Attractiveness or incongruity? Academy of International Business Conference, San Diego, CA
Tang, L, Koveos, P., 2008a. Embodied and disembodied R&D spillovers to developed and developing countries. *International Business Review* 17: 546-558
_____, 2008b. A formal framework to update Hofstede's cultural value indices: Economic dynamics and institutional stability, *Journal of International Business Studies*, 39(6):1045-1063.
Wheeler, K. & Mody, A. 1992. International investment and location decisions: the case of U.S. firms. *Journal of International Economics* 33: 57-76
Zaheer, S. 1995. Overcoming the liability of foreignness, *Academy of Management Journal*, 38(2): 341-363
Zaheer, S. and S. Manrakhan, 2001. Concentration and dispersion in global industries: Remote electronic access and the location of economic activities. *Journal of International Business Studies* 32 (4): 667-686
Zaheer, S. and Zaheer, A, 2001. Market microstructure in a global B2B network. *Strategic Management Journal* 22: 859-873

APPENDIX: Countries in the Sample

OECD Countries		Non-OECD Countries	
Australia	Korea	Argentina	Thailand
Austria	Mexico	Brazil	Turkey
Canada	Netherlands	Colombia	Venezuela
Denmark	New Zealand	Hong Kong	
Finland	Portugal	India	
France	Spain	Indonesia	
Germany	Sweden	Israel	
Greece	Switzerland	Malaysia	
Ireland	United Kingdom	Philippines	
Italy	United States	Singapore	
Japan		South Africa	