# NATIONAL INSTITUTIONS, ENTREPRENEURSHIP AND GLOBAL ICT ADOPTION: A CROSS-COUNTRY TEST OF COMPETING THEORIES

Candace A. Martinez
John Cook School of Business
St. Louis University
3674 Lindell Blvd. St. Louis, MO 63108, USA
cmarti58@slu.edu

Christopher Williams
Amsterdam Business School
University of Amsterdam
Plantage Muidergracht 12
1018 TV Amsterdam The Netherlands
C.Williams@uva.nl

## ABSTRACT

To better understand the development of e-commerce across countries we utilize competing theories to examine information and communication technology (ICT) adoption, a critical foundation of global e-commerce. On the one hand, economic institutional theory predicts that strong national institutions will engender trust and thus foster arms length business transactions in a society, such as those conducted using ICT. On the other hand, entrepreneurship theory suggests that new business creation is a main driver of ICT adoption. Drawing on a sample of 80 countries, we find strong support for the institutional argument and weak support for the entrepreneurship view. Our findings further indicate that institutional quality is especially critical in developing countries where it is an important driver for both the basic and more advanced technologies that underpin e-commerce. Implications for theory and public policy are discussed.

Key words: information, communication, and technology (ICT), e-commerce, entrepreneurship, institutions, institutional quality

## 1. Introduction

Confidence in the economic system is a very important element in today's modern business context. This is especially true for e-business where value is created through impersonal, arms-length transactions [Amit and Zott, 2001]. The Internet supports virtual markets through various mechanisms, including high connectivity, a focus on transactions, importance of information goods and services, and high reach and richness of information [Amit and Zott, 2001]. Others have pointed to physical infrastructure as a key determinant of Internet use [Oxley and Yeung, 2001]. Physical infrastructure studies highlight differences in the ways in which core technologies such as telephone networks are accepted and used by consumers and organizations in various countries [e.g., Meso Musa, and Mbarika, 2005; Chan and Ngai, 2007]. Without the trust and acceptance (and consequent use) of an underlying infrastructure and Internet application layer, e-commerce is not possible.

In the current study, we examine the antecedents of e-commerce in terms of Information and Communication Technology (ICT) adoption. Global e-commerce and ICT adoption have been put under empirical scrutiny by previous scholars who have examined their determinants with regard to cultural differences across countries [Erumban and de Jong, 2006; Zhao, Kim, Suh, and Du, 2008] and institutional differences [Oxley and Yeung, 2001]. Other scholarly inquiry has focused on the issue of the global digital divide, that is, the gap between rich and poor countries regarding the access to technologies available to their inhabitants [Baliamoune-Lutz, 2003; Goldstein and O'Connor, 2002; van Dijk and Hacker, 2000; Wilson, 2004].

The first theoretical lens we use to frame our examination of ICT as an underlying foundation of e-commerce is institutional theory. Recent research has highlighted the role of reliable institutions as a key factor within the national institutional framework [e.g., Henisz, 2000; Oxley, 1999]. The core argument of this view is that good quality institutions inspire confidence in the ability of a government to monitor and enforce codes of conduct and laws, thus allowing individuals to trust that the system will protect commercial transactions wherever they occur – in

physical space or cyberspace [Shareef, Kumar, and Kumar, 2008]. We extend this perspective to include an entrepreneurship theoretic lens and contend that both theories shed light on the underpinnings of e-commerce. On the one hand, institutional theory [North, 1990, 2005; Scott, 1998] provides strong arguments that explain the acceptance and use of technologies that enable e-commerce. Constructing legally binding contracts, minimizing opportunistic behavior, and providing open and fair access for dispute settlement are some examples of how this theory can apply to e-commerce. On the other hand, entrepreneurship theory [Schumpeter, 1934; Baron, 1998; Shane and Venkataraman, 2000; Low, 2001] provides alternative reasons regarding a society's adoption of ICT. Countries with higher levels of entrepreneurship will experience greater demand for information search capabilities to assess risk, as well as more attempts to use e-commerce in pursuit of entrepreneurial gains. These in turn will drive greater adoption of ICT. While institutions devise, regulate, and enforce the rules of the game, entrepreneurs are key actors within the game itself, seeking to exploit new opportunities.

We test these two competing theories in a cross-country study of eighty countries for which reliable institutional and new business creation data are available. We use a multiple equation analysis using seemingly unrelated regression (SUR) [Zellner, 1962] to test our hypotheses on four different indicators of ICT adoption. After controlling for economic development and market size, our findings suggest that institutional quality is more important than levels of entrepreneurship in explaining adoption of ICT.

## 2. The Conceptual Model: Institutions and Entrepreneurial Activity

According to institutional scholars, it is the interaction between organizations and institutions that shapes economic activities across borders [North, 1990, 2005]. Institutions provide the structure in which business transactions occur [North, 1990], that is, they constrain the behaviour of individuals and organizations (firms, governments, and other actors). This structure commonly takes the form of regulations, but also includes normative (social obligations) and cognitive (collective constructions of social reality) aspects [Hoffman and Ventresca, 1999; Scott, 1998]. In this sense, institutions set "the rules of the game" through coercive, mimetic and normative mechanisms [DiMaggio and Powell, 1983; Scott, 1998] and even determine the level of stability and order in societies [North, 1990; North, Wallis, and Weingast, 2009]. They provide the conditions that protect or undermine property rights and that increase or decrease foreign direct investment and resource commitment risk [Brouthers, 2002]. In the contradictory scenario, when so-called "institutional voids" exist in a society, business transactions become scarcer and riskier, thus limiting international competitiveness, especially in developing countries [Khanna and Palepu, 1997].

According to entrepreneurship scholars, it is the individual entrepreneur that bears risk in search of exploitation of newly identified opportunity [Knight, 1921]. Individual entrepreneurs are visionaries, providing the idea by which a new firm arises: entrepreneurs "believe that they have found a better way of allocating resources" [Casson, 1997: v]. The successful entrepreneur anticipates the future state of the market better than others and attempts to give the consumers what they want: the highest quality at the lowest cost. Disappointed consumers will vote in a "daily ballot" in their buying and abstention behaviour, thereby determining the success of the entrepreneur [Kirzner, 1973]. This body of literature highlights the role of the individual entrepreneur in generating new business models and opportunities for economic activity. In essence, different personality characteristics imply that there are varying levels of cognition, rationality and effort amongst a population. In this view, the creation of new businesses in order to conduct commercial transactions is driven by individual entrepreneurs.

E-commerce represents an important domain for economic activity that differs in meaningful ways from traditional (i.e., "bricks and mortar") domains for conducting commercial transactions. Perhaps the most important difference is the global reach of the Internet and the opportunities for international business through Internet technology and applications. Understanding the international diffusion of e-commerce therefore requires specific attention to theories that explain country differences with regard to economic activity. The institutional and entrepreneurial views are prominent in this respect. While the former is about setting the rules of the game, the latter is concerned with the game itself: the pieces in the board. Although scholars have recently examined the diffusion of e-commerce from institutional [e.g., Oxley and Yeung, 2001] and entrepreneurial [e.g., Amit and Zott, 2001] theoretic perspectives, there is a gap in our understanding about how these quite different logics play out in tandem. We address this perceived lacuna by exploring institutional and entrepreneurial predictors of information and communication technology (ICT), the fundamental technological components that underpin e-commerce across countries. Without elements of ICT being in place, e-commerce is not possible. ICT represents the basic technological infrastructures that e-commerce relies on: the existence of a telephone network for communication and transmission of raw data and the presence of an Internet (through service providers) for transmission and interpretation of data within the Internet Protocol (IP) [e.g., Goldstein and O'Connor, 2002; Gibbs, Kraemer, and Dedrick, 2002]. Scholars have used ICT adoption to understand the phenomenon of e-commerce in various domains,

including both business-to-business transactions over the Internet [e.g., Buhalis and Deimezi, 2003; Pires and Aisbett, 2003] as well as business-to-consumer transactions [e.g., Srinivasan, Anderson and Ponnavolu, 2002]. Our conceptual model is shown in Figure 1.

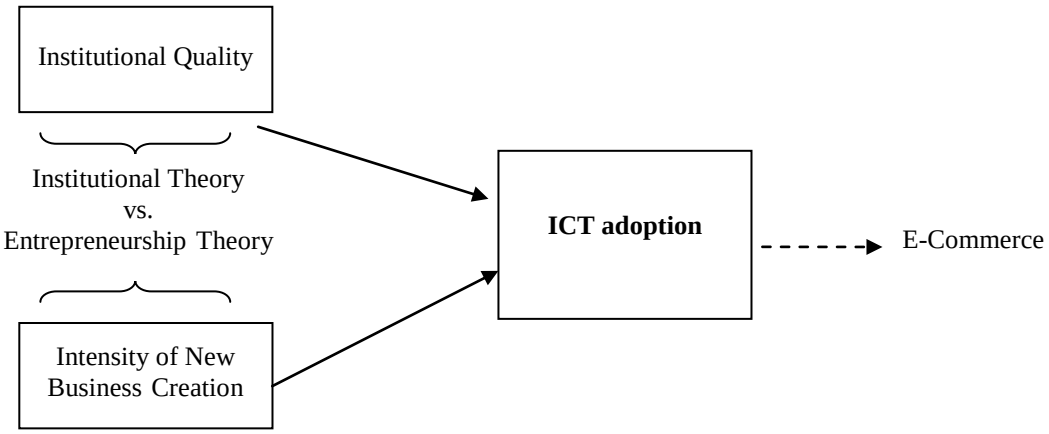


Figure 1: Conceptual Framework

## 3. Theory and Hypotheses

### 3.1. Institutional Theory: The "Rules of the Game" Argument

In response to recent calls for business scholars to include an institutional component to their research on international phenomena [Dunning and Lundan, 2008; Peng, Wang, and Jing, 2008; Peng, Sun, Pinkham, and Chen, 2009], we first apply an institutional theoretical lens to answer our research question. In other words, what impact does a country's institutional quality have on the adoption of ICT within its borders? In those countries where the quality and content of institutions are strong (i.e., an effective rule of law, respect for property rights), what effect does this have on the underlying foundations of e-commerce?

While the definitions of institutions and institutional environment (institutional framework or context) abound (See [Hodgson 2006] for a thorough discussion), in this study we define the institutional environment as the set of fundamental political, socio-economic, and legal ground rules that establishes the basis for production, exchange, and distribution [Davis and North, 1971] and institutions as the humanely devised constraints that structure human interaction [North, 1994]. Institutions set the boundary conditions under which business occurs [North, 1990], they are the dynamic, sense-making frames that guide actors/organizations to behave in appropriate ways, and they give meaning to goals, motives and actions [Scott, 1998]. In short, they are the rules of the game, both formal and informal norms of behaviour.

We focus on the role of formal institutions in society, that is, those that are explicitly created, usually by law and government directives [North, 1990]. They include written rules, regulations, laws and contracts that represent the choices made by a society to give structure to their relations with others. Property rights, checks and balances in the branches of government that promote political stability, laws that protect freedom of the press -- these are all examples of formal institutions. Strong formal institutions build trust among individuals in their society's ability to conduct business transactions (and to punish transgressors), a confidence that is paramount to successfully competing in today's global market place. As Arrow [1968] notes:

*One of the characteristics of a successful economic system is that the relations of trust and confidence between principal and agent are sufficiently strong so that the agent will not cheat even though it may be 'rational economic behavior' to do so. The lack of such confidence has certainly been adduced by many writers as one cause of economic backwardness. [Arrow 1968: 538]*

Previous scholarly inquiry has tested the association of formal institutions with overseas inter-firm alliance formation [Oxley, 1999], with multinational firms' choice of entry mode when they internationalize [Shan, 1991; Peng and Heath, 1996; Delios and Beamish, 1999; Meyer, 2001; Brouthers, 2002], with aggregate levels of foreign direct invest stock or inflows [Brewer, 1993; Loree and Guisinger, 1995; Bevan, Estrin, and Meyer, 2004], with levels of political risk [Henisz and Williamson, 1999; Henisz and Delios, 2001] and with corruption [Cuervo-Cazurra, 2008]. As far as the theoretical underpinnings of the extant body of empirics on institutions, the eclectic paradigm [Dunning, 1981, 2000], internalisation theory [Rugman, 1981], and transaction costs economics [Hennart,

1982; Williamson, 1985] have proven to be the most useful for explaining and predicting the association between formal institutions and the aforementioned phenomena.

To the best of our knowledge few empirical studies have examined the effects of formal institutions and the integrity of the institutional environment on the adoption of ICT. Two exceptions are Oxley and Yeung [2001] and Zhao, Kim, Suh, and Du [2008]. The former cross-sectional study found a statistically significant and positive relationship between institutional environments that support e-commerce and the proliferation of the Internet in a sample of 30 countries. The latter longitudinal study examined the effect of various social and economic institutions on e-commerce diffusion and found that the rule of law had a positive effect and one cultural dimension, uncertainty avoidance, had a negative effect. Both studies corroborate that the level of Internet activity across countries is positively associated with the quality of a country's institutions, that is, the stronger the institutional environment (the legal, political, and socio-economic framework) of a country, the more likely that markets are developed, transactional integrity exists, and that businesses (and consumers) can be expected to use the Internet to carry out transactions [Oxley and Yeung, 2001]. Similarly, a weak institutional environment leads to distrust and ultimately lower levels of Internet commerce. When trust is low, consumers are wary of the opportunistic behavior that impersonal markets may engender, in part because the safeguards to monitor and punish illegal behavior are weak. It follows that individuals in these societies would lack confidence in e-commerce, the most impersonal of markets, to conduct their transactions.

We therefore argue that a strong, high-quality institutional environment will undergird a society's use of ICT, a prerequisite for e-commerce activity. Hence we hypothesize:

*Hypothesis 1: Ceteris paribus, institutional quality is positively associated with a country's adoption of ICT.*

3.2. Entrepreneurial Activity: The "Game Itself" Argument

In addition to the institutional argument described above, we also utilize an entrepreneurship perspective to illuminate our understanding of the drivers of ICT across countries. Entrepreneurship is concerned with commercializing new products and services, it is a major driver of technological advancement, and it is a primary source of wealth creation within nations [Hitt and Reed, 2000]. Entrepreneurship theory places an emphasis on the relationship between the entrepreneur and the opportunity [Shane and Venkataraman, 2000; Low, 2001], affirming that the decision to start a new business rests on the judgement made by an individual entrepreneur (or group of entrepreneurs) that an opportunity for wealth creation exists and can be feasibly exploited. A large stream of literature has examined the characteristics of the individual entrepreneur, in particular his/her motivation and personality traits. The entrepreneur is able to make decisions under uncertainty; s/he has the foresight and confidence to do so [Knight, 1921]. Through an awareness of change in the environment and knowledge about how to combine resources in new ways, the entrepreneur disrupts economic equilibrium [Schumpeter, 1934]. Thus entrepreneurs are people who welcome risk, uncertainty, innovation, perception and change [Hébert and Link [1988]. According to other viewpoints, entrepreneurs are less interested in creating personal financial fortune as they are in desiring personal involvement, responsibility and an independent quality and style of life [Jennings and Beaver, 1997]. Baron [1998] argued that an entrepreneur is someone with an increased propensity to adopt certain types of thinking (counterfactual thinking, regret affect infusion, self-serving bias, planning fallacy and self-justification) who thrives in an environment where information overload, high uncertainty, high novelty, strong emotions, high time pressure and fatigue are present. According to Bloodgood *et al.* [1995], the entrepreneur is someone who has acquired certain background factors that foster entrepreneurial behavior, stemming from personality, skills, values and training.

At a country level, entrepreneurship is seen as a principal source of economic growth. It is well established that differences in entrepreneurial activity exist between countries [Goldstein and O'Connor, 2002; Lee and Williams, 2007; Thomas and Mueller, 2000]. Some countries emphasize technological cooperation and national systems of innovation that aim to boost new venture creation [e.g., Bartholomew, 1997] through country-specific agencies acting as knowledge-integrators and enablers of entrepreneurial venturing [Collinson and Gregson, 2003]. Other countries stress more localized - or sub-national - factors that can influence the levels of entrepreneurship [Parker and Tamaschke, 2005]. Audretsch and Thurik [2001] contrast the newly emerging entrepreneurial economy with the managed economy. Entrepreneurial economies have emerged through the driving forces of globalization: developments in information technology and communications coupled with an increasing availability of highly-skilled but inexpensive labour force [Audretsch and Thurik, 2001]. The managed economy stresses the role of central government in restricting the power of large corporations, encouraging public ownership, fostering regulation aimed at controlling competition, and emphasizing traditional factors of production, such as land, labour and capital. The entrepreneurial economy, by contrast, stresses competition and decentralization of power away from central government. Deregulation, increased private ownership, and a high tolerance for new and small

businesses become important in the entrepreneurial economy, as does an emphasis on knowledge-based human capital as a critical factor of production [Audretsch and Thurik, 2001].

There are a number of reasons why entrepreneurial activity within a country will be associated with ICT adoption. Firstly, central to the phenomenon of entrepreneurship is the relationship between individuals and opportunities [Shane and Venkataraman, 2000]. According to entrepreneurial cognition theory [Baron, 1998, 2004], entrepreneurial ventures are driven by individuals and it is individuals who will demand to use technological tools to develop these activities. Following this reasoning, the identification of a new opportunity, its evaluation, and the decision to allocate resources to exploiting it cannot be designed by institutions in advance. Secondly, entrepreneurship is characterized by high knowledge asymmetry amongst actors. Scholars have shown how entrepreneurship arises because knowledge is asymmetric [Corbett, 2007] and dispersed [Dew, Velamuri, and Venkataraman, 2004]. ICT can be used to reduce knowledge asymmetry and information search costs [e.g., Srinivasan *et al*., 2002]. The adoption of ICT allows entrepreneurs to connect and interact with other important actors during the new venture creation process. Alibaba.com, for example, allows importers and exporters to become aware of each other, enabling them to explore new opportunities for international trade. Thirdly, e-commerce is itself a potent domain for entrepreneurial endeavor [Amit and Zott, 2001], often arising in situations of high competitiveness, low entry barriers and potentially high returns [da Silveira, 2003]. New business models and ways of conducting commercial transactions are constantly arising, and entrepreneurial firms are well-positioned to take advantage of growth opportunities in e-commerce [Mullane *et al*., 2001]. Protocols such as www, tcp, ftp, telnet, etc, support value creating applications, which are themselves the designs of entrepreneurs.

The preceding discussion leads us to hypothesize:

*Hypothesis 2: Ceteris paribus, high levels of new business creation are positively associated with a country's adoption of ICT.*

### 3.3. The Interaction between Institutional Quality and New Business Creation

In addition to these direct effects we further posit an indirect effect between institutional quality and entrepreneurship in our model. As we argued above, institutional quality encourages a society's use of modern technologies that underpin e-commerce by engendering transaction integrity. We argue that this relationship will be stronger in countries where there are also high levels of entrepreneurial activity, i.e., new business creation. Sociological studies of trust indicate that good governance quality leads to reliable social order and individuals are more inclined to trust institutions [Möllering, 2006]. On the other hand, economists have often pointed out that flexible economies are also "institutionally rich" [Streeck, 1989]. Thus, the state, too, plays an important role in providing entrepreneurial vision for its economy [Chang, 1994]. In countries with strong institutions, individual actor's trust in rule compliance will encourage ICT use. The presence of state support for entrepreneurship will then amplify this relationship. Individuals will trust the institutional system, not only in the sense of guaranteeing the integrity of arm's length transactions, but also in the sense that entrepreneurial activity is both legitimate and appropriate. We therefore posit:

*Hypothesis 3: Ceteris paribus, the positive association between institutional quality and a country's adoption of ICT is strengthened when the level of new business creation in the country is high.*

### 3.4. OECD Membership, Technology Maturity and ICT Adoption

The thirty member countries of the Organization for Economic Cooperation and Development (OECD) agree to broad principles for fostering economic and industrial development within a free market system (Convention on the Organisation for Economic Co-operation and Development, 1960). It is widely noted that OECD countries are richer, more economically developed and generally more liberalized than non-member countries, although a number of studies have highlighted divergence within the group in key areas such as regulation, productivity and growth [e.g., Nicoletti, Scarpetta and Lane, 2003]. Nevertheless, levels of industrialization are generally higher in OECD countries than in non-OECD countries, not least because of government subsidies for industrial activity and technological development [Ford and Suyker, 1990]. Because of this, it is likely that the maturity of a specific ICT technology will impact its adoption differently when we contrast OECD and non-OECD countries.

Applying the institutional quality argument (*H1* above), we expect that confidence in the economic system that governs commercial transactions will be more of a necessary condition when a technology is relatively new in a society. General acceptance of new technologies is more likely to require the support of institutional laws and regulations that guarantee their integrity. Time needs to elapse to reveal whether the institutional safeguards are effective. When adopting mature ICT technology, however, a society will require less strenuous institutional prerequisites. Older, more basic technologies are tried and tested; government regulations supporting their use will have had time to become settled and established. Thus, less institutional support is demanded. This logic implies that for more developed economies, like the OECD countries, institutional quality will be more compelling for newer technologies, but not for older, more established ones. In contrast, for the non-OECD countries, where there are

lower levels of industrial and economic development, we would anticipate that these societies need institutional assurances that attest to the transactional integrity of both basic (mature) and newer, more advanced technologies. Hence we hypothesize:

*H4a: In more developed countries, institutional quality will have a positive association with the adoption of newer technologies but not with that of mature technologies.*

*H4b: In less developed countries, institutional quality will have a positive association with the adoption of both newer and mature technologies.*

## 4. Methodology, Variables, and Measures

### 4.1. Sample

Drawing the sample for this study was constrained by the datasets available to us as we gathered the dependent, independent and control variables for each country from various reliable secondary sources. The challenge when merging the datasets was to retain as many observations as possible. An analysis of the main sources we relied on for the ICT adoption measurements yielded an initial sample size of 227 countries (*World Bank Development Indicators*, the *CIA World Factbook*, and the *Global Information Technology Report*). The World Bank's Entrepreneurship Survey dataset, however, covers approximately 100 economies from 2000-2007. The four dimensions of entrepreneurship the survey measures (total, new, business density, and entry rate) have differing availability according to country source and year. Accounting for other missing data for the remaining countries yielded a final sample size of 80. These countries had a total of approximately 3.9 billion people, a little over half of the world's population. We tested for and confirmed representativeness of the final sample (reported in the "Analysis" section). The countries in the final sample include the following:

*Algeria, Argentina, Australia, Austria, Azerbaijan, Bangladesh, Belgium, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Canada, Chile, Colombia, Croatia, Czech Republic, Denmark, Egypt., El Salvador, Finland, France, Georgia, Germany, Greece, Guatemala, Hong Kong (China), Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Latvia, Lithuania, Luxembourg, Madagascar, Malaysia, Mexico, Moldova, Morocco, Netherlands, New Zealand, Nicaragua, Norway, Oman, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Senegal, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Syrian Arab Republic, Tanzania, Thailand, Tunisia, Turkey, Uganda, Ukraine, United Kingdom, United States, Zambia.*

### 4.2. Dependent Variables

Table 1 summarizes the variables, definitions, measurements, and sources used in this study.

In our model we use four dependent variables as measures for various aspects of ICT adoption within a country. Other studies have investigated e-commerce by using these or similar ICT measures. For example, in a recent study in Great Britain by the Office of National Statistics [2007] it was found that typical business communication needs, such as dial-up connections, mobile Internet connections, and the use of DSL (all types of ICT) support companies' ability to use the electronic market place to carry out such typical tasks as sharing information electronically with suppliers and customers, tracking the progress of deliveries, and using their websites as sales tools. Baliamoune-Lutz [2003] explored the factors that influence ICT diffusion in developing and developed countries by using Internet hosts, Internet users, personal computers and mobile phones to proxy for ICT. Buhalis and Deimezi [2003] studied ICT and e-commerce development in Greece and used Internet usage among the entire population to proxy for business level adoption of ICT. Similarly, Goldstein and O'Connor [2002] analyzed the contribution of e-commerce in developing countries by measuring ICT with total Internet usage rates across countries, claiming that the Internet is a manifestation of the worldwide ICT technological revolution. Gibbs, Kraemer, and Dedrick [2002] used evidence from case studies in ten countries to argue that e-commerce diffusion is most associated with telecommunication liberalization by making ICT and Internet access more affordable to firms and consumers.

Drawing on this literature, we test the effects of institutions and entrepreneurship using four distinct proxies for ICT adoption.

- Internet users refers to those people within a country with access to the worldwide network. We obtained these data from the World Bank's World Development Indicators. Their definition includes users who access the Internet at least several times a week to those who seldom access it. Internet use is measured as an intensity: the number of users per 100 inhabitants of a country (variable name: Internet users).

Table 1: Data Labels, Variable Type, Definitions, Measurements, and Sources

| Data Labels | Variable Type | Definitions | Measurements | Sources |
|---|---|---|---|---|
| Internet users | Dependent (1) | All Internet users in a country (per 100 people) | Average for 2006-2007. | *World Development Indicators* (The World Bank) http://web.worldbank.org/WEBSITE/EXTERNAL/DATASTATISTICS/ |
| Internet hosts | Dependent (2) | Number of computers connected to the Internet with a unique IP address | Natural log of absolute number of Internet hosts in 2008 | *The CIA World Factbook* https://www.cia.gov/library/publications/the-world-factbook/ |
| ICT use | Dependent (3) | Composite of individual, business and government usage of ICT | Third component of Network Readiness Index (NRI) 2007-2008 (theoretical range: 1 – 7) | *Global Information Technology Report* (World Economic Forum) |
| Phone users | Dependent (4) | All fixed line and mobile phone subscribers/users in a country (per 100 people) | Average for 2006-2007 | *World Development Indicators* (The World Bank) |
| GDP per capita | Control | Economic output in target country per inhabitant | Natural log of 5-year average output/total population, 2000-2005 | *World Development Indicators* (The World Bank) |
| Population | Control | The number of inhabitants within the geographical boundaries of a country | Natural log of population, average for 2000-2005 | *World Development Indicators* (The World Bank) |
| OECD | Control | Whether or not the sampled country is one of the 30 developed countries that belongs to the Organisation for Economic Co-operation and Development | Dummy variable: 1 = Member of OECD; 0 = otherwise | http://www.oecd.org |
| Institutional quality | Independent | How effective a government is based on the presence of six dimensions in a society: voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption. | The 2000-2005 average of six aggregate governance indicators measured in units ranging from -2.5 to +2.5. Higher values indicate higher institutional quality. | *World Governance Indicators* (The World Bank) http://info.worldbank.org/governance/wgi/index.asp |
| Entrepre-neurship | Independent | New density | The 2000-2005 average of the number of newly registered corporations divided by total working age population | The 2008 World Bank Group Entrepreneurship Survey |

- The measure for telephone users similarly follows the World Bank's definition: those subscribers or users of telephones, including both fixed-line and mobile.[1] These data were also taken from the World Bank's World Development Indicators. Telephone use is also measured as an intensity: The number of fixed line and mobile phone subscribers per 100 people in a country (variable name: phone users).
- The number of Internet hosts available within a country measures how many computers are connected directly to the Internet; normally an Internet Service Provider's (ISP) computer is a host. According to the *CIA World Factbook*, the source for these data, the number of hosts a country has is one indicator of the extent of its Internet connectivity (variable name: Internet hosts).
- ICT use is a measurement taken from the Network Readiness Index (NRI) 2007-2008, published in the *Global Information Technology Report* (World Economic Forum). This is a broader measure of Internet use, comprising individual, business and government usage of ICT over a period of one year (variable name: ICT use).

4.3. Independent Variables

Institutions and entrepreneurship are the two principal independent variables in this study. To operationalize the relative strength of a country's institutions, we utilize the WGI, the World Bank's Worldwide Governance Indicators [Kaufmann, Kraay, and Mastruzzi, 2009]. The yearly WGI index is an aggregate indicator comprising six measures that define how effective the legal traditions and institutions are in 212 countries from 1996–2008**.** They have been estimated using the results from 13 different survey institutes, think tanks, non-governmental organizations, and international organizations, including Business Environment Risk Intelligence (BERI), the Heritage Foundation, the World Economic Forum, and the Economist Intelligence Unit. According to the World Bank Group, governance and institutions are linked in the following conceptual way:

> *Governance consists of the traditions and institutions by which authority in a country is exercised. This includes the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them.*
>
> *(The World Bank Group, Worldwide Governance Indicators, 1996-2008)*

While admittedly no one measure can truly capture the complex legal, political, and socio-economic systems that encompass a society's institutional environment, the WGI cover a broad and inclusive range of functions that characterize an institutionally sound country, from a free press (voice and accountability) to the quality of the police force and the court system (rule of law). Consequently the World Governance Indicators have been used extensively by social science scholars to proxy for country-level institutional strength [Bovaird and Loffler, 2003; Globerman and Shapiro, 2002; May, Pyle, and Sommers, 2002]. Globerman and Shapiro [2002] imply that governance and institutions are cut from the same cloth when they note that government polices encouraging markets that are free and open, public institutions that are stable, credible and honest, and a legal system that is effective, impartial, and transparent are among the dimensions of a country that define institutional quality and a "positive" governance infrastructure.

The six dimensions that comprise the World Governance Indicators are:

- *voice and accountability* (the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media);
- *political stability and absence of violence* (the likelihood that the government will not be destabilized or overthrown by unconstitutional or violent means, including political violence and terrorism);
- *government effectiveness* (quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies);
- *regulatory quality* (ability of the government to formulate and implement sound policies and regulations that permits and promotes private sector development);
- *rule of law* (the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence);

[1] The World Bank notes that these Internet and phone data are drawn from the International Telecommunication Union, from the World Telecommunication Development Report and database, as well as from World Bank estimates.

- *control of corruption* (the control over the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests).

As expected, we observed extremely high correlations among the six variables ($0.76<r<0.98$, $p<0.001$) justifying the use of the arithmetic mean as a measure of overall institutional quality. Scores range from -2.50 to +2.50; a relatively high score on this variable indicates a stable institutional environment in the host country, while a relatively low score indicates a more unstable and volatile institutional environment (variable name: institutional quality [IQ]).

We captured entrepreneurship by measuring new business creation activity in a country. Specifically, we use "new density" or the number of newly registered corporations divided by total working age population as measured by the World Bank Group's Entrepreneurial Survey (WBGES) database [Klapper, Amit, Guillen, and Quesada, 2008]. The WBGES provides data for five different measures of new business creation for more than 100 countries from 2000-2007, although many countries have missing data for some years. We chose the new density measure as this most closely approximates the fundamental nature of entrepreneurship that we want to capture in this study, namely the rate of new business creation. As this is a normalized measure, we are thus able to reliably compare this variable across countries with different numbers of registered businesses for which the data are available (variable name: entrepreneurship [ENT]).

For both key independent variables of interest we used averages for 2000-2005, thus allowing a minimum one year lag between these and the dependent variable [Contractor, 1991: 43-44].

4.4. Control variables

Other factors may influence the level of ICT adoption in a country in addition to institutional quality and entrepreneurship. We controlled for the possibility that economic development of a country creates demand for more technologically advanced products such as ICT. Following previous scholars we used the natural log of the country's GDP per capita [Vaaler and Schrage, 2009], obtained from the World Bank's Worldwide Development Indicators and averaged over a 6-year period [2000-2005]. The expected positive coefficient would indicate that developed economies are more apt to use ICT. We also controlled for another alternative explanation for the dependent variables, namely that the size of a country's market is related to ICT. While it makes intuitional sense to predict that countries with more inhabitants will yield more phone and Internet consumers, it is also true that many of the world's largest countries (e.g., India, China, Indonesia, Pakistan) are developing or in economic transition and, therefore, have large rural areas in which telecommunications technology deployment and use are low. Following previous scholars [Contractor, 1990; Henisz and Delios, 2001], we proxied market size by using the natural log of a country's population, using the 2000-2006 average. We make no prediction of the direction of this effect as a positive sign would signify that higher populated countries have more access to the underlying technology needed for e-commerce; a negative sign would indicate that country size does not predispose a nation to have access to these modern tools. This measure was also taken from the World Bank's Worldwide Development Indicators database. Finally, we included a dummy variable to control for a country's membership in the Organization for Economic Co-operation and Development (OECD), a group of the world's 30 wealthiest economies. Since it is feasible that richer countries are more likely to have higher ICT access and adoption, we controlled for this likelihood with a dummy variable: 1 = OECD membership and 0 = otherwise. A positive sign on this coefficient would indicate that OECD countries have a higher diffusion of ICT adoption.

4.5. Analysis

We examined the descriptive and inter-correlations amongst the variables of interest. We note that all variables are normally distributed and have acceptable distribution and variance (Table 2).

Table 2: Descriptive Statistics

| Variable | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|
| Internet users | 27.75 | 24.17 | 0.29 | 85.65 |
| Internet hosts (natural log) | 12.03 | 3.59 | 1.61 | 19.57 |
| ICT use | 3.76 | 0.96 | 2.27 | 5.89 |
| Phone users | 93.12 | 54.91 | 3.49 | 193.67 |
| | | | | |
| GDP per Capita (natural log) | 3.53 | 0.71 | 2.27 | 4.78 |
| Population (natural log) | 16.42 | 1.52 | 12.41 | 20.78 |
| OECD | 0.30 | 0.46 | 0 | 1 |
| Institutional quality | 0.23 | 0.96 | -1.79 | 1.91 |
| Entrepreneurship | 49.14 | 28.97 | 4.00 | 112.88 |

Given the limitation of the availability of the new business creation data, we checked for bias by conducting a non-response check using t-tests for country characteristics in our model (i.e., population, GDP, institutional quality, entrepreneurship, plus the four dependent variables). We found no statistically significant differences between the 80 countries in our final sample and the excluded countries on any of these variables. Thus we have no reason to believe selection bias will influence our interpretation of the results.

Assuming that without a reliable infrastructure (ICT, hosts, phone), Internet use is hardly feasible, it can be expected that the dependent variables in the present analysis are highly correlated. We confirmed that the inter-correlation between the dimensions was statistically significant in our dataset ($0.623<r<0.871$). In order to optimize efficiency over separate linear regression models, we built a multiple equation system using seemingly unrelated regression (SUR) [Zellner, 1962]. This technique accounts for potential correlation of error terms between equations and is suitable in applications where the responses in different regression models are potentially connected [Percy, 1992]. This applies in our case and the use of SUR also enabled us to inspect any un-hypothesized differential effects. In all models that follow, the Breusch-Pagan test of independence indicated the residuals to be independent ($18.031 < \chi^2 < 38.622$, $p<0.001$).

We statistically analyzed the data by running three models in STATA using SUR: a control model, a full direct effects model in order to test the hypotheses *H1* and *H2*, and an interaction model in order to test *H3*. In order to test *H4a and H4b*, we repeated the SUR analysis on two sub-samples, namely, OECD countries and non-OECD countries, using two of the four dependent variables: Internet users (representing adoption of a newer technology) and phone users (representing adoption of a mature technology). We chose these two operationalizations as the most appropriate for capturing the essence of what constitutes a relatively "new' technology versus a relatively old or "mature" one.

## 5. Results

Table 3 reports the correlation matrix. As expected, ICT adoption appears to be higher in more developed countries. Country size (population), however, is negatively associated with use, but positively associated with number of host machines. In terms of the two independent variables, institutional quality has a strong positive association with ICT adoption, whereas new business creation has a weak effect.

Table 3: Correlation Matrix

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Internet users 1 | | | | | | | | |
| Internet hosts (natural log) 2 | 0.642*** | | | | | | | |
| ICT use 3 | 0.871*** | 0.623*** | | | | | | |
| Phone users 4 | 0.809*** | 0.691*** | 0.819*** | | | | | |
| GDP per Capita (natural log) 5 | 0.858*** | 0.674*** | 0.884*** | 0.906*** | | | | |
| Population (natural log) 6 | -0.163 | 0.291*** | -0.152 | -0.236* | -0.187 | | | |
| OECD 7 | 0.712*** | 0.594*** | 0.702*** | 0.656*** | 0.762*** | -0.035 | | |
| Institutional quality 8 | 0.846*** | 0.651*** | 0.906*** | 0.830*** | 0.883*** | -0.206+ | 0.777*** | |
| Entrepreneurship 9 | 0.042 | -0.007 | 0.113 | -0.035 | -0.055 | 0.115 | 0.012 | 0.029 |

***p<0.001 **p<0.01 *p<0.05 +p<0.1

Table 4 presents the results of the SUR estimation for the full sample. In terms of control variables, we note that country economic development (GDP per capita) is a strong predictor of ICT adoption (all equations). Country size has a statistically significant and positive influence on number of hosts. In the main direct effects model (Model 2), we observe a positive and statistically significant relationship between institutional quality and the two equations

relating to individual and organizational ICT adoption: Internet users and ICT use ($p<0.01$). However, no statistical significance is achieved for the effect of institutional quality on number of Internet hosts and phone users. Thus we find partial support only for *H1*. None of the equations for new business creation achieve statistical significance. *H2* is therefore not corroborated. In Model 3 we also observe a statistically insignificant effect of the interaction between institutional quality and new business creation. Thus we have no support for *H3*.

We tested Hypotheses *H4a* and *H4b* on a partitioned sample of more developed and less developed countries[1]. Tables 5 and 6 show the results of the seemingly unrelated regression for OECD and non-OECD countries respectively, using two equation systems for Internet users (adoption of a newer technology) and phone users (adoption of a mature technology). As expected, we find that institutional quality has a statistically significant effect on Internet users but not on phone users in OECD countries, providing support for *H4a*. In non-OECD countries institutional quality has a statistically significant effect in the predicted direction for both newer and mature technology adoption, lending support for *H4b*. In both cases, the statistical significance is mild ($p<0.10$), but positive.

## 6. Discussion and Concluding Remarks

This study examines antecedents of ICT adoption from institutional and entrepreneurial viewpoints. We present and test institutional and entrepreneurship theoretical logics to ascertain which perspective better explains and predicts the variation in ICT adoption across countries, a utilization that has been shown in previous empirical studies to support e-commerce activity [Oxley and Yeung, 2001; Zhao *et al*., 2008]. Our main contribution is to deepen our understanding of the factors that influence ICT adoption across countries. The key finding of this study provides evidence for the quality of national institutions. We find that a more open, accountable and effective society with a stronger rule of law, political stability, regulatory quality, and control of corruption, *does* foster utilization of ICT, and that, contrary to expectations, levels of new business creation do not. Thus our analysis corroborates the institutional view that, *ceteris paribus*, the strength and integrity of the formal legal, political, and socio-economic institutions of a country exert a positive influence on its access to and use of the technologies that support e-commerce. A further test to examine the relationship between a country's level of development and its technology maturity vis-à-vis ICT adoption confirms the robustness of established institutional arguments while also accounting for the roles that a country's economic development and the degree of technological maturity have. Specifically we find evidence that institutional quality is associated with adoption of newly emerging technology (and not mature technology) in OECD countries, whereas in non-OECD countries institutional quality is important to both new and mature technology use. This more refined analysis lends credence to the important role of governments in addressing the digital divide of the globalized world, i.e., income and wealth inequalities across countries may limit poorer societies from adopting the technological advances that richer countries can and do.

[1] For the partitioned sample, more available data for Internet users and phone users allowed us to add the following seven countries: Ghana, Haiti, Lebanon, Malawi, Maldives, Rwanda, and Yemen.

Table 4: Results of Seemingly Unrelated Regression Analysis – Full Dataset

| **Variable** | **Model 1** | | | | **Model 2** | | | | **Model 3** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Internet users** | **Internet hosts** | **ICT use** | **Phone users** | **Internet users** | **Internet hosts** | **ICT use** | **Phone users** | **Internet users** | **Internet hosts** | **ICT use** | **Phone users** |
| *Control variables* | | | | | | | | | | | | |
| GDP per Capita | 26.05*** | 2.93*** | 1.19*** | 73.58*** | 16.90*** | 2.60*** | 0.59*** | 70.13*** | 17.01*** | 2.65*** | 0.58*** | 70.75*** |
| [natural log) | [3.36) | [0.50) | [0.12) | [5.96) | [4.59) | (0.73) | (0.14) | (8.65) | (4.66) | (0.74) | (0.14) | (8.78) |
| Population | -0.77 | 0.88*** | 0.02 | -1.81 | -0.12 | 0.91*** | 0.06* | -1.59 | -0.12 | 0.91*** | 0.06* | -1.55 |
| (natural log) | (0.98) | (0.15) | (0.03) | (1.74) | (0.96) | (0.15) | (0.03) | (1.82) | (0.97) | (0.15) | (0.03) | (1.82) |
| OECD | 6.27 | 0.94 | 0.08 | -9.90 | 0.65 | 0.78 | -0.27+ | -12.11 | 0.62 | 0.76 | -0.27+ | -12.30 |
| | (4.72) | (0.71) | (0.16) | (8.38) | (4.80) | (0.76) | (0.14) | (9.06) | (4.81) | (0.76) | (0.14) | (9.06) |
| *Independent variables* | | | | | | | | | | | | |
| Institutional | | | | | 10.46** | 0.36 | 0.68*** | 3.99 | 10.41** | 0.33 | 0.68*** | 3.68 |
| quality (IQ) | | | | | (3.71) | (0.59) | (0.11) | (7.01) | (3.73) | (0.59) | (0.11) | (7.04) |
| Entrepreneurship | | | | | 0.05 | -0.00 | 0.00 | 0.03 | 0.05 | -0.00 | 0.00 | 0.04 |
| (ENT) | | | | | (0.05) | (0.01) | (0.00) | (0.09) | (0.05) | (0.01) | (0.00) | (0.10) |
| IQ x ENT | | | | | | | | | -0.20 | -0.09 | 0.01 | -1.13 |
| | | | | | | | | | (1.45) | (0.23) | (0.04) | (2.72) |
| R-Square | 0.724 | 0.621 | 0.787 | 0.818 | 0.757 | 0.623 | 0.860 | 0.819 | 0.757 | 0.624 | 0.861 | 0.819 |
| Chi Square | 209.71 | 130.87 | 295.15 | 358.92 | 248.78 | 132.23 | 493.18 | 361.99 | 248.85 | 132.63 | 493.59 | 362.94 |
| N | 80 | | | | 80 | | | | 80 | | | |
| Breusch-Pagan | 38.386*** | | | | 29.964*** | | | | 29.927*** | | | |

***p<0.001 **p<0.01 *p<0.05 +p<0.1 Robust standard errors are in parentheses under each coefficient.

Table 5: Results of Seemingly Unrelated Regression Analysis on Internet vs. Phone Users – OECD countries

| **Variable** | **Model 1a** | | **Model 2a** | | **Model 3a** | |
|---|---|---|---|---|---|---|
| *Dependent variables:* | **Internet users** | **Phone users** | **Internet users** | **Phone users** | **Internet users** | **Phone users** |
| *Control variables* | | | | | | |
| GDP per Capita (natural log) | 42.40*** | 51.43*** | 10.82 | 40.58* | 11.89 | 44.05* |
| | (9.95) | (11.65) | (15.29) | (19.09) | (16.20) | (20.14) |
| Population | -0.17 | -2.52 | 1.07 | -2.69 | 0.97 | -3.01 |
| (natural log) | (1.56) | (1.83) | (1.54) | (1.93) | (1.61) | (2.01) |
| *Independent variables* | | | | | | |
| Institutional quality (IQ) | | | 22.74* | 5.78 | 21.80* | 2.73 |
| | | | (9.19) | (11.47) | (10.33) | (12.85) |
| Entrepreneurship (ENT) | | | 0.04 | 0.15 | 0.12 | 0.41 |
| | | | (0.08) | (0.10) | (0.40) | (0.50) |
| IQ x ENT | | | | | -1.68 | -5.47 |
| | | | | | (8.48) | (10.55) |
| R-Square | 0.409 | 0.467 | 0.525 | 0.512 | 0.525 | 0.517 |
| Chi Square | 18.68*** | 23.62*** | 29.81*** | 28.33*** | 29.89*** | 28.88*** |
| N | 27 | | 27 | | 27 | |
| Breusch-Pagan | 1.867 | | 4.118* | | 4.246* | |

***p<0.001 **p<0.01 *p<0.05 +p<0.1 Robust standard errors are in parentheses under each coefficient.

Table 6: Results of Seemingly Unrelated Regression Analysis on Internet vs. Phone Users – Non-OECD countries

| **Variable** | **Model 1b** | | **Model 2b** | | **Model 3b** | |
|---|---|---|---|---|---|---|
| *Dependent variables:* | **Internet users** | **Phone users** | **Internet users** | **Phone users** | **Internet users** | **Phone users** |
| *Control variables* | | | | | | |
| GDP per Capita (natural log) | 22.91*** | 76.03*** | 18.27*** | 64.53*** | 18.27*** | 64.91*** |
| | (2.87) | (6.44) | (4.01) | (9.11) | (4.01) | (8.99) |
| Population | -0.72 | -0.84 | -0.32 | -0.00 | -0.32 | -0.02 |
| (natural log) | (1.07) | (2.40) | (1.05) | (2.39) | (1.05) | (2.37) |
| *Independent variables* | | | | | | |
| Institutional quality (IQ) | | | 6.18+ | 13.70+ | 6.18+ | 13.27+ |
| | | | (3.45) | (7.84) | (3.45) | (7.74) |
| Entrepreneurship (ENT) | | | 0.04 | -0.07 | 0.04 | -0.14 |
| | | | (0.05) | (0.12) | (0.06) | (0.13) |
| IQ x ENT | | | | | -0.03 | -6.03 |
| | | | | | (0.06) | (4.67) |
| R-Square | 0.555 | 0.724 | 0.588 | 0.737 | 0.588 | 0.745 |
| Chi Square | 74.85 | 157.49*** | 85.63*** | 168.57*** | 85.63*** | 174.94*** |
| N | 60 | | 60 | | 60 | |
| Breusch-Pagan | 10.051** | | 8.935** | | 9.168** | |

***p<0.001 **p<0.01 *p<0.05 +p<0.1 Robust standard errors are in parentheses under each coefficient.

In terms of policy implications, our study suggests that institutional quality does make a difference. Through purposeful legislation that allows private investment in their countries to flourish, governments can foster the adoption of technologies that lay the foundation for economic prosperity through e-commerce. This is especially important in developing countries where our findings suggest that individuals and organizations in non-OECD countries rely more heavily on the institutional environment for their ability to use basic (telephone) and more advanced (Internet) communication equipment. Laws that prohibit or curtail private investment in these technologies may find their restrictive measures to be counterproductive in the long run. Centrally controlled countries, such as Cuba, for example, that severely limit access to phones, mobile technology, and the Internet may inadvertently invite negative externalities by hindering potential FDI inflows into ICT. A thornier legal issue may arise when there is a discrepancy in the home country legal framework and that of the host country. Witness U.S. multinational corporations' (Microsoft, Yahoo, and Google) recent woes as they faced the U.S. Congress over their role in facilitating the Chinese government in restricting access to material or in revealing the names of dissidents at their locations in China. Investigating the implications of the "regulatory distance" between two countries and its effects on the adoption of ICT would clearly be an interesting avenue of fruitful empirical inquiry. Although beyond the scope of this study, it would also be informative to examine the reverse causality of our model, that is, whether ICT drives institutional quality and levels of entrepreneurship across countries, whether it affects advanced countries differently from developing countries, and how this would influence public policy.

The present study has a number of limitations. Firstly, we use a cross-sectional methodology which, by its nature, precludes our drawing any conclusions about the changes that have occurred over time or about the future direction of ICT adoption. Secondly, our sample size limits our ability to generalize from these results. Had data been available for more countries we could have linked our findings to particular regions of the world or different levels of income. Thus, we cannot conjecture about the geographic dispersion of e-commerce activity. Although we partitioned the sample into developed (OECD) and developing (non-OECD) countries, only twenty-seven countries fell into the first category. It is hoped that other data sources will become available to permit future research to expand on our study. Thirdly, while our results clearly indicate that institutional quality has more influence on ICT adoption within a country than does the level of entrepreneurship, we acknowledge that there may be countervailing arguments to account for the lack of empirical support for entrepreneurship theory. Our model specification was simple; our measurements for ICT adoption do not capture commercial transactions which may mirror more accurately the impetus of an entrepreneurial economy. While we argued that e-commerce has grown, at least in part, due to the level of ICT in a country, perhaps the link between entrepreneurs and new opportunity exploitation is not so straightforward.

Future research should address these shortcomings and continue to expand our understanding of the relationships between institutions, entrepreneurs, economic development and technology adoption in order to understand the diffusion of e-commerce across countries. The importance of e-commerce to the successful development of a country's economic system seems indisputable. The U.S. Census reported that in 2007 e-commerce grew faster than total economic activity in three of the four major economic sectors that it covers. More research is needed to understand this growing phenomenon and to disentangle the complex relationship between e-commerce and the country-level factors that encourage or impede its growth. The global digital divide issue needs to be explored further, as well. While our study corroborates other digital divide research which indicates that some elements of ICT are influenced by a country's income level [e.g. Baliamoune-Lutz, 2003], other empirical evidence suggests that mobile phone technology in a large developing country (China) will be adopted at higher levels than that of the Internet because mobile phone technology is increasingly a substitute for, not a complement of, Internet connectivity [Park, Yang, and Lehto, 2007]. Future investigation can illuminate what is actually occurring in developing countries vis-à-vis ICT adoption and shed more light on this timely issue. Empirical investigations that examine e-commerce diffusion growth with formal modeling and simulation [Mukhopadhyay, Samaddar and Nargundkar, 2008] can also fine-tune the insights of this study as can those that utilize a case study methodology [Shareef, Kumar, and Kumar, 2008].

Whatever methods used and theoretical lens applied, however, much work needs to be done to fully understand the increasingly important phenomenon of e-commerce. Despite the non-results for the entrepreneurial view for this study, we strongly urge other scholars to continue to subject e-commerce to empirical scrutiny to tease out the theoretical and conceptual rationales.

**Acknowledgment**

The authors thank the editors and the reviewers for their valuable suggestions.

## REFERENCES


Amit, R. and C. Zott, "Value Creation in E-business," *Strategic Management Journal*, Vol. 22:493-520, 2001.

Arrow, K.J., "The Economics of Moral Hazard: Further Comment," *The American Economic Review*, Vol. 58, No. 3:537-539, 1968.

Audretsch, D.B. and A.R. Thurik, "What's New About the New Economy? Sources of Growth in the Managed and Entrepreneurial Economies," *Industrial and Corporate Change*, Vol. 10:267-315, 2001.

Baliamoune-Lutz, M., "An Analysis of the Determinants and Effects of ICT Diffusion in Developing Countries," *Information Technology for Development*, Vol. 10:151-169, 2003.

Baron, R.A., "Cognitive Mechanisms in Entrepreneurship: Why and When Entrepreneurs Think Differently Than Other People," *Journal of Business Venturing*, Vol. 13:275-294, 1998.

Baron, R.A. "The Cognitive Perspective: A Valuable Tool for Answering Entrepreneurship's Basic 'Why' Questions," *Journal of Business Venturing*, Vol. 19:221-239, 2004.

Bartholomew, S. "National Systems of Biotechnology Innovation: Complex Interdependence in the Global System," *Journal of International Business Studies*, Vol. 28:241-266, 1997.

Bevan, A., S. Estrin, and K. Meyer, "Foreign Investment Location and Institutional Development in Transition Economies," *International Business Review*, Vol. 13:43-64, 2004.

Bloodgood, J.M., H.J. Sapienza, and A.L. Carsrud, "The Dynamics of New Business Start-ups: Person, Context and Process," in *Advances in Entrepreneurship, Firm Emergence, and Growth,* J.A. Katz and R. H. Brockhaus, Sr. (eds.), Vol. *2*, Greenwich, CT: JAI Press, pp. 123-144, 1995.

Bovaird, T., and E. Loffler, "Evaluating the Quality of Public Governance: Indicators, Models and Methodologies," *International Review of Administrative Sciences*, Vol. 69, No. 3:313-328, 2003.

Brewer, T., "Government Policies, Market Imperfections, and Foreign Direct Investment," J*ournal of International Business Studies*, Vol. 24:101-120, 1993.

Brouthers, K., "Institutional, Cultural and Transaction Cost Influences on Entry Mode Choice and Performance," *Journal of International Business Studies*, Vol. 33:203-221, 2002.

Buhalis, D. and O. Deimezi, "Information Technology Penetration and E-commerce Developments in Greece, with a Focus on Small to Medium-sized Enterprises," *Electronic Markets*, Vol. 13:309-324, 2003.

Casson, M.C., *Information and Organization: A New Perspective on the Theory of the Firm*, Oxford: Oxford University Press, 1997.

Chan, S., and E. Ngai, "A Qualitative Study of Information Technology Adoption: How Ten Organizations Adopted Web-Based Training," *Information Systems Journal*, Vol. 17, No. 3:289-315, 2007.

Chang, H.-J. "State, Institutions and Structural Change," *Structural Change and Economic Dynamics*, 5:293-313, 1994.

CIA – The World Factbook, https://www.cia.gov/library/publications/the-world-factbook/. Accessed 20 September 2009.

Collinson, S. and G. Gregson, "Knowledge Networks for New Technology-Based Firms: an International Comparison of Local Entrepreneurship Promotion," *R&D Management*, Vol. 33:189-208, 2003.

Contractor, F., "Ownership Patterns of U.S. Joint Ventures Abroad and the Liberalization of Foreign Government Regulations in the 1980's: Evidence from the Benchmark Survey," *Journal of International Business Studies*, Vol. 21:55-73, 1990.

Contractor, F., *Government Policies and Foreign Direct Investment*. New York: United Nations, pp. 43-44, 1991.

Convention on the Organisation for Economic Co-operation and Development 1960, http://www.oecd.org/document/7/0,3343,en_2649_201185_1915847_1_1_1_1,00.html, accessed 10 October, 2009.

Corbett, A.C., "Learning Asymmetries and the Discovery of Entrepreneurial Opportunities," *Journal of Business Venturing*, Vol. 22:97-118, 2007.

Cuervo-Cazurra, A. "The Effectiveness of Laws against Bribery Abroad," *Journal of International Business Studies*, Vol. 39:634-651, 2008.

Da Silveira, G.J.C., "Towards a Framework for Operations Management in E-commerce," *International Journal of Operations and Production Management*, Vol. 23:200-212, 2003.

Davis, L., and D. North, *Institutional Change and American Economic Growth*, Cambridge, U.K.: Cambridge University Press., 1971.

Delios, A., and P. Beamish, "Ownership Strategy of Japanese Firms: Transactional, Institutional, and Experience Influences," *Strategic Management Journal*, Vol. 20:915-933, 1999.

Dew, N., S. R. Velamuri, and S. Venkataraman, "Dispersed Knowledge and an Entrepreneurial Theory of the Firm," *Journal of Business Venturing*, Vol. 19:659-679, 2004.

DiMaggio, P.J. and W.W. Powell, "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," *American Sociological Review*, Vol. 2:147-160, 1983.

Dunning, J.H. *International Production and the Multinational Enterprise*, London: Allen and Unwin. 1981.

Dunning, J. H., "Globalization and the Theory of MNE Activity," *The Globalization of Multinational Enterprise Activity and Economic Development*, Hood and Young, eds., U.K.: Macmillan Press Limited, 2000.

Dunning, J.H. and S.M. Lundan, "Institutions and the OLI Paradigm of the Multinational Enterprise," *Asia Pacific Journal of Management*, Vol. 25:573-593, 2008.

Erumban, A.A., and S.B. de Jong, "Cross-country Differences in ICT adoption: A Consequence of Culture?" *Journal of World Business*, Vol. 41, No. 4:302-332, 2006.

Ford, R. and W. Suyker, "Industrial Subsidies in the OECD Economies," *OECD Economic Studies*, 15:37-81, 1990.

Gibbs, J., K.L. Kraemer, and J. Dedrick, "Environment and Policy Factors Shaping E-commerce Diffusion: a Cross-Country Comparison," The Center for Research on Information Technology and Organizations, University of California, Irvine, 2002.

Globerman, S. and D. Shapiro, "Global Foreign Direct Investment Flows: The Role of Governance Infrastructure," *World Development*, Vol. 30, No. 11:1899-1919, 2002.

Goldstein, A. and D. O'Connor, "E-commerce for Development: Prospects and Policy Issues," OECD Development Technical Paper, http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.122.120&rep=rep1&type=pdf, 2002.

Hébert, R.F. and A.N. Link, *The Entrepreneur - Mainstream Views and Radical Critiques*, New York: Praeger, 1988.

Henisz, W., "The Institutional Environment for Multinational Investment," *The Journal of Law, Economics and Organization*, Vol. 16:334-364, 2000.

Henisz, W. and A., Delios, "Uncertainty, Imitation, and Plant Location: Japanese Multinational Corporations, 1990-1996," *Administrative Science Quarterly*, Vol. 46:443-475, 2001.

Henisz. W. and O.E., Williamson, "Comparative Economic Organization --- Within and Between Countries," *Business and Politics*, Vol. 1:261-277, 1999.

Hennart, J.F. *A Theory of Multinational Enterprise*. Ann Arbor, Michigan: University of Michigan Press, 1982.

Hitt, M.A. and T.S., Reed, "Entrepreneurship in the New Competitive Landscape," in Meyer, G.D and Heppard, K.A. (eds.) *Entrepreneurship as Strategy: Competing on the Entrepreneurial Edge*, Thousand Oaks, CA: Sage Publications, pp. 23-47, 2000.

Hodgson, G., "What Are Institutions?" *Journal of Economic Issues*, Vol. 40:1-25, 2006.

Hoffman, A.J. and M.J., Ventresca, "The Institutional Framing of Policy Debates: Economics Versus the Environment," *American Behavioral Scientist*, Vol. 42:1368-1392, 1999.

Jennings, P. and G. Beaver, "The Performance and Competitive Advantage of Small Firms: a Management Perspective," *International Small Business Journal*, Vol. 15:63-75, 1997.

Kaufmann, D., A. Kraay, and M. Mastruzzi, "Governance Matters VIII: Aggregate and Individual Governance Indicators, 1996-2008," World Bank Policy Research Working Paper No. 4978. Available at SSRN: http://ssrn.com/abstract=1424591, June 29, 2009. Accessed 15 June 2009.

Khanna, T., and K. Palepu, "Why Focused Strategies May Be Wrong for Emerging Markets," *Harvard Business Review*, July-August, 41-51, 1997

Klapper, L., R. Amit, M. Guillen, and J.M. Quesada, "The World Bank Group Entrepreneurship Survey," Policy Research Working Paper no. WPS 4313. http://econ.worldbank.org/external/default/main?menuPK=64166093&pagePK=64165259&piPK=64165421&theSitePK=469382&repNo=WPS4313, 2008. Accessed 12 June 2009.

Knight, F.H., *Risk, Uncertainty and Profit*, Boston: Houghton Mifflin, 1921.

Kirzner, I.M., *Competition and Entrepreneurship*, Chicago: University of Chicago Press, 1973.

Lee, S.H. and C. Williams, "Institutional Foundations of Entrepreneurship: An Introduction and Cross-Country Comparisons," *Journal of Interdisciplinary Economics*, Vol. 18:113-121, 2007.

Loree, D.W. and S.E. Guisinger, "Policy and Non-Policy Determinants of US Equity Foreign Direct Investment," *Journal of International Business Studies*, Vol. 26:281–299, 1995.

Low, M.B., "The Adolescence of Entrepreneurship Research: Specification of Purpose," *Entrepreneurship Theory and Practice*, Vol. 25:17-25, 2001.

May, J.W., Pyle, W., and P.M. Sommers, "Does Governance Explain Unofficial Activity?" *Applied Economics Letters*, Vol. 9:537-539, 2002.

Meso, P., Musa, P. and V. Mbarika, "Towards a Model of Consumer Use of Mobile Information and Communication Technology in LDCs: the Case of Sub-Saharan Africa," *Information Systems Journal*, Vol. 15:119-146, 2005.

Meyer, K., "Institutions, Transaction Costs, and Entry Mode Choice in Eastern Europe," *Journal of International Business Studies*, Vol. 32:357-367, 2001.

Möllering, G. "Trust, Institutions, Agency: Towards a Neoinstitutional Theory of Trust," in R. Bachmann and A. Zaheer (eds) *Handbook of Trust Research*, Cheltenham, U.K.: Edward Elgar, 355-376, 2006.

Mukhopadhyay, S., S. Samaddar, and S. Nargundkar, "Predicting Electronic Commerce Growth: An Integration of Diffusion and Neural Network Models," *Journal of Electronic Commerce Research*, Vol. 9, No. 4: 280-295, 2008.

Mullane, J.V., M.H. Peters, and K.E. Bullington, "Entrepreneurial Firms as Suppliers in Business-to-Business E-Commerce," *Management Decision*, Vol. 39: 388-393, 2001.

Nicoletti, G., S. Scarpetta, and P.R. Lane, "Regulation, Productivity and Growth: OECD Evidence," *Economic Policy*, Vol. 18:9-72, 2003.

North, D., *Institutions, Institutional Change and Economic Performance*, New York: Cambridge University Press, 1990.

North, D., "Economic Performance through Time," *The American Economic Review*, Vol. 84:359-368, 1994.

North, D., *Understanding the Process of Economic Change***,** New Jersey: Princeton University Press, 2005.

North, D., J. Wallis, and B. Weingast, *Violence and Social Orders: A Conceptual Framework for Interpreting Recorded Human History*, New York: Cambridge University Press, 2009.

Office of National Statistics, "E-commerce and ICT Activity, 2007: E-commerce Survey of Business," http://www.statistics.gov.uk/pdfdir/ecom1108.pdf, 2007. Accessed 12 October 2009.

Oxley, J.E., "Institutional Environment and the Mechanisms of Governance: The Impact of Intellectual Property Protection on the Structure of Inter-firm Alliances," *Journal of Economic Behaviour and Organization*, Vol. 38:283-309, 1999.

Oxley, J.E. and B. Yeung, "E-commerce Readiness: Institutional Environment and International Competitiveness," *Journal of International Business Studies*, Vol. 32:705-723, 2001.

Park, J., S.J. Yang, and X. Lehto, "Adoption of Mobile Technologies for Chinese Consumers," *Journal of Electronic Commerce Research*, Vol. 8, No. 3:196-206, 2007.

Parker, R. and L. Tamaschke, "Explaining Regional Departures from National Patterns of Industry Specialization: Regional Institutions, Policies and State Coordination," *Organization Studies*, Vol. 26: 1787-1807, 2005.

Peng, M. and P. Heath, "The Growth of the Firm in Planned Economies in Transition: Institutions, Organizations, and Strategic Choice**,"** *Academy of Management Review*, Vol. 21:492-528, 1996.

Peng, M., S. Sun, B. Pinkham, and H. Chen, "The Institution Based View as a Third Leg for a Strategy Tripod," *Academy of Management Perspectives*, Vol. 23, No. 3:63-81, 2009.

Peng, M., D. Wang, and Y. Jing, "An Institution-Based View of International Business Strategy: A Focus on Emerging Economies," *Journal of International Business Studies*, Vol. 39:920-936, 2008.

Percy, D.F., "Prediction for Seemingly Unrelated Regressions," *Journal of the Royal Statistical Society*, Vol. 54, No. 1: 243-252, 1992.

Pires, G.D., and J. Aisbett, "The Relationship between Technology Adoption and Strategy in Business-to-Business Markets : The Case of E-commerce," *Industrial Marketing Management*, 32:291-300, 2003.

Rugman, A., *Inside the Multinationals: The Economics of Internal Markets*, London,U.K.: Croom Helm, 1981.

Scott, R., *Organizations*, Upper Saddle River, NJ: Prentice Hall, 1998.

Shan, W., "Environmental Risks and Joint Venture Sharing Arrangements," *Journal of International Business Studies*, Vol. 22:555-578, 1991.

Srinivasan, S.S., R. Anderson, and K. Ponnavolu, "Customer Loyalty in E-Commerce: An Exploration of its Antecedents and Consequences," *Journal of Retailing*, Vol. 78:41-50, 2002.

Schumpeter, J.A. "Entrepreneurship as Innovation," in Swedberg, R. (1934) (ed.) *Entrepreneurship – The Social Science View*, Oxford, U.K.: Oxford University Press, pp. 51-75, 2000.

Shane, S. and S. Venkataraman, "The Promise of Entrepreneurship as a Field of Research," *Academy of Management Review*, 25:217-226, 2000.

Shareef, M., U. Kumar, and V. Kumar, "Role of Different Electronic-Commerce Quality Factors on Purchase Decision: A Developing Country Perspective," *Journal of Electronic Commerce Research*, Vol. 9, No. 2: 92-113, 2008.

Streeck, W. "Skills and the Limits of Neo-Liberalism: The Enterprise of the Future as a Place of Learning," *Work, Employment and Society*, 3:89-104, 1989.

Srinivasan, S.S., R. Anderson, and K. Ponnavolu, "Customer Loyalty in E-commerce: An Exploration of Its Antecedents and Consequences," *Journal of Retailing*, Vol. 78:41-50, 2002.

Thomas, A.S. and S.L. Mueller, "A Case for Comparative Entrepreneurship: Assessing the Relevance of Culture," *Journal of International Business Studies*, Vol. 31:287-301, 2000.

Timmons, J.A. *New Venture Creation: Entrepreneurship for the 21st Century*, Illinois: Irwin, 1994.

Vaaler, P., and B. Schrage, "Residual State Ownership, Policy Stability and Financial Performance following Strategic Decisions by Privatizing Telecoms," *Journal of International Business Studies*, Vol. 40, No. 4: 621-641, 2009.

Van Dijk, J., and K. Hacker, "The Digital Divide as a Complex and Dynamic Phenomenon," *The Information Society*, Vol. 19: 315-326, 2003.

Williamson, O. *The Economic Institutions of Capitalism*. New York: Free Press, 1985.

Wilson, III. E.J., *The Information Revolution and Developing Countries.* Cambridge, MA: The MIT Press, 2004.

(The) World Bank Group. *Worldwide Governance Indicators, 1996-2008.* http://info.worldbank.org/governance/wgi/index.asp Accessed 15 June 2009.

(The) World Bank Group. *World Bank Development Indicators, 2000-2007* http://ddp-ext.worldbank.org/ext/DDPQQ/showReport.do?method=showReport. Accessed 15 June 2009.

Zacharakis, A.L., G.D. Meyer, and J. DeCastro, "Differing perceptions of new venture failure: a matched exploratory study of venture capitalists and entrepreneurs," *Journal of Small Business Management*, 37: 1-14, 1999.

Zellner, A., "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias," *Journal of the American Statistical Association,* Vol. 57:348-368, 1962.

Zhao, H., S. Kim, T. Suh, and J. Du, "Social Institutional Explanations of Global Internet Diffusion: A Cross-Country Analysis," *Selected Readings on Global Information Technology*, Hakikur Rahman (ed.), Information Science Reference, Hershey, New York, pp. 347-372, 2008.