Moderating Effects of Governance on Information Infrastructure and E-Government Development

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Drawing from the resource complementarity perspective of the resource-based view of a firm, this study examines the complementary role of governance dimensions—namely, voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption—on the relationship between information infrastructure in a country and its e-government development. Based on publicly available archival data from 178 countries, our results provide support for the hypothesized model. Specifically, whereas political stability, government effectiveness, and rule of law moderated the relationship of information infrastructure with e-government development in a positive direction, voice and accountability and control of corruption moderated the relationship negatively. Further, the relationship between information infrastructure and e-government development was not contingent on regulatory quality. Our findings contribute to the theoretical discourse on e-government development by highlighting the complementary role of governance and provide suggestions for practice in managing e-government development by enhancing governance, thereby leveraging the effect of information infrastructure on e-government development.

Introduction

E-government, which can be broadly defined as the use of information and communication technologies (ICTs) and the Internet to enhance access to and delivery of all facets of government services and operations for the benefit of citizens, businesses, employees, and other stakeholders, is continuously transforming public service delivery systems

(Srivastava & Teo, 2007). Srivastava (2011) classified e-government research into three broad areas: the evolution and development of e-government initiatives, adoption and implementation perspectives, and the impact of e-government on stakeholders. Although much research has been conducted in these three areas, most studies tend to be "micro" in orientation, focusing on "particular aspects" of e-government development with reference to a "particular region or country." Although the need to look at the macro-level (i.e., cross-country level) perspective is largely stressed in the past literature, researchers (with few exceptions) often ignored or overlooked them for two reasons. First, as noted by Heeks and Bailur (2007), there is a lack of cumulative theoretical development in e-government research to design an empirical study addressing macro-level issues. Second, collecting large-scale primary data (spanning several countries) to empirically test the formulated research model is constrained by the amount of resources and time available for conducting such research (Srivastava & Teo, 2008). Predicated on these two concerns, this study uses archival data to conduct a cross-country quantitative empirical study in the context of e-government.

E-government development in a country represents the level of functional sophistication of its e-government Web sites (United Nations, 2010). Although the development of e-government involves significant investment of resources for governments, it is not only expected to bring in benefits such as increased responsiveness to citizens' needs, revenue growth, and cost reductions (Chen, Pan, & Huang, 2009; Ho, 2002; Tan & Pan, 2003), but also to have the potential to make valuable and effective connections between government and citizens (G2C), businesses (G2B), employees (G2E), and other governments (G2G) (Siau & Long, 2009). Various studies (e.g., Chan, Hackney, Pan, & Chou, 2011; Chan, Lau, & Pan, 2008) indicate that the proposed gains of

e-government continue to be an "elusive dream" for many governments worldwide despite the massive amount of resources invested in the development process. To illustrate, a study by Heeks (2008), in the context of developing countries, indicated that 35% of e-government initiatives were "total failures," with the initiative being never implemented or immediately abandoned after implementation. Further, the study reported that 50% of e-government initiatives were "partial failures" due to undesirable outcomes. Taken together, these statistics indicate that despite the multiplicity of motivations and service targets underlying public institutions, successful development of e-government is a challenging task in most countries.

Motivated by this challenge, several studies (e.g., Siau & Long, 2009; Singh, Das, & Joseph, 2007; Srivastava & Teo, 2010) have examined the country-level facilitators of e-government development. Most studies emphasize the need for sound and reliable information infrastructure (among other factors) in a country for its e-government development. For instance, Srivastava and Teo (2010, p. 274) established that "ICT infrastructure is vital for the development of e-government . . . if there is poor infrastructure, development of e-government is greatly inhibited." Another study by Siau and Long (2009, p. 101) noted that "ICT plays an essential role in the growth and development of e-government . . . e-government needs to utilize all kinds of information and computer technology in order to deliver government information and services to the public." Further, Singh et al. (2007) highlighted that the maturity of e-government in a country depends on the state of the ICT infrastructure, because such infrastructure limits the proportion of the citizenry that can be served by e-government services. While the presence of sound and reliable information infrastructure in a country, as noted by the UN, is an "enabling environment" for its e-government development (United Nations, 2008), it may have greater impact in the presence of certain other "enabling factors" (Srivastava & Teo, 2008). That is, in addition to having a sound and reliable information infrastructure, e-government development may be contingent upon the presence of certain other "complementary national assets." Given that "good governance has the potential to contribute to the transformation of the public sector, resulting in greater cost savings, enhanced efficiency and reduced administrative burden" (United Nations, 2008, p. 8), we posit that the effect of information infrastructure on e-government development would be further strengthened by the complementary role of governance. Our theoretical reasoning for the complementary role of governance is consistent with Weill's (1991) concept of "conversion effectiveness": Governance strongly influences how resources (in our case, the information infrastructure) are effectively converted into productivity measures (in our case, national e-government development). In sum, we posit that e-government development is not merely contingent on the information infrastructure alone but also on governance.

Although the contingent role of governance has seldom received attention in the global context (Meso, Datta, & Mbarika, 2006), the role of governance is well illustrated in organizational productivity research (e.g., Soh & Markus, 1995; Weill, 1991). Further, previous research in information sciences (e.g., Morgan & Cong, 2003) and development studies (e.g., Jessop, 1998; Meso et al., 2006) has connected technology with governance. In addition, most studies examining the influence of governance on e-government development have been undertaken via a qualitative approach (e.g., Madon, Sahay, & Sudan, 2007). Unlike those studies, we seek to identify whether there is quantitative merit in the complementary role of governance on the relationship between information infrastructure and e-government development. Although the insights we gained cannot substitute for the deep insights obtainable from a qualitative assessment of the combined impacts of information infrastructure and governance within a single case study or a handful of comparative case studies, we believe that they will shed light on the contributions of governance at the national level by providing a macro-perspective of its complementary effects on the relationship between information infrastructure and e-government development. In sum, the specific research question (RQ) that we address in this study is:

> RQ: How does a nation's governance interact with information infrastructure in enhancing its e-government development?

This article is organized as follows. First, by using the resource complementarity perspective of the resource-based view (RBV) of a firm as our guiding theoretical lens, we explicate the significance of governance as national complementary asset on the relationship between information infrastructure and e-government development. Thereafter, using secondary data from 178 countries (see Appendix for the list of countries), we test the hypothesized model. Subsequently, we discuss our findings and their contributions to the knowledge base in e-government research. Lastly, we highlight the major limitations of our study and offer future research directions.

Theoretical Background

The RBV of a firm is an influential framework within the field of strategic management that positions firms as a specific collection of resources and capabilities that can be deployed to achieve competitive advantage over their competitors (Barney, 1991). It suggests that differences in firm performance are primarily the result of resource heterogeneity across firms. That is, firms that are able to accumulate resources and capabilities which are rare, valuable, non-substitutable, and imperfectly imitable will achieve an advantage over competitors (Barney, 1991; Wade & Hulland, 2004). Firm resources are defined as tangible and intangible assets and competencies owned or controlled by the firm that can be used to conceive and implement competitive strategies (Järvenpää & Leidner, 1998). Capabilities, in contrast, refer to a firm's capacity to

deploy resources using organizational processes (Amit & Schoemaker, 1993).

Researchers have noted the contribution of new applications and combinations of existing resources to competitive advantage (Grant, 1996). Teece (1986) introduced the concept of complementary assets (or resource complementarities), which are resources or capabilities that allow firms to capture the profits associated with a strategy, technology, or innovation. He suggested that in order to commercialize the design for a new product profitably, a firm needs access to complementary manufacturing and distribution facilities on favorable terms. Even if other firms can imitate the new product, they will not be able to gain competitive advantage from this imitation if they do not have access to the necessary complementary assets. In the RBV literature, resource complementarities have been conceptualized in two different ways (Ravichandran & Lertwongsatien, 2005). First, according to the resource copresence view (or interaction perspective), firm resources are considered complementary when the presence of one resource enhances the value or effect of another resource. That is, a resource produces greater returns if certain other resources are present than it would produce by itself. Second, the resource channeling view posits that complementarities arise when resources and capabilities are used in a mutually reinforcing manner. This is based on how resources are channelized and utilized in a firm.

Although the concept of resource complementarities was originally proposed to study a firm-level phenomenon (Teece, 1986), several researchers have extended its core arguments to different levels (e.g., country-level) and established its usefulness in different empirical settings. For instance, Srivastava and Teo (2008), extending the resource complementarity perspective, established that e-government development in a country in association with national complementary assets, such as human capital, public institutions, and macro-economic conditions, has the potential to enhance its business competitiveness. Consistent with them, in this study we consider six dimensions of governance—(a) voice and accountability, (b) political stability, (c) government effectiveness, (d) regulatory quality, (e) rule of law, and (f) control of corruption—as the national complementary assets that will affect the relationship between information infrastructure and e-government development. We chose these as they have the potential to (a) contribute to the transformation of the public sector, resulting in greater cost savings, enhanced efficiency, and reduced administrative burden (United Nations, 2008); and (b) leverage the effect of information infrastructure on national development (Meso et al., 2006).

Application of the concept of governance as a national complementary asset can explain why only some countries are able to attain high levels of e-government development from information infrastructure investments. Complementary assets can be defined as the assets required to attain high levels of e-government development from information infrastructure. If the investment in information infrastructure requires good governance, only countries that possess such governance will be able to attain high levels of e-government development from investing in such infrastructures. That is, governance will moderate the relationship between information infrastructure and e-government development. This argument is in line with what Weill (1991) terms "conversion effectiveness": Governance strongly influences how resources (i.e., information infrastructure) are effectively converted to productivity measures (i.e., e-government development).

Research Model and Hypotheses Development

As Tapscott (1996) notes, information infrastructure is the gradual convergence of broadcasting content, telecommunications, and computing. In an organizational sense, as Selwyn and Brown (2000) stated, information infrastructure is envisioned as encompassing "all computerized networks, applications and services that citizens can use to access, create, disseminate and utilize digital information" (p. 662). The impact of information infrastructures on the development of e-government in a country can be explained by drawing on arguments from neoclassical and new growth theories, economic theories originally developed to understand the determinants of actual growth, differences in growth rates over time and space, and policies for raising growth rates (Siau & Long, 2009). According to these theories, technological progress and creativity are critical determinants of growth and development (Lucas, 1988; Romer, 1990). Extending this argument in the context of e-government development, it is logical to assume that information infrastructure in a country can contribute to the development of e-government systems as e-government development needs to utilize ICTs for delivery of public services (Siau & Long, 2009). This is also stressed by Srivastava and Teo (2010). According to them, government and its agencies can fulfill their duties (as related to the daily activities of citizens and businesses in a nation) effectively using e-government systems only when they are connected with the citizens and businesses, which is possible only when a sound information infrastructure is in place. Warkentin, Gefen, Pavlou, and Rose (2002) emphasized that e-government is characterized by the extensive use of ICTs that stimulate the growth and development of e-government. Koh, Ryan, and Prybutok (2005) and Singh et al. (2007) established that e-government development will remain an "unrealized dream" in the absence of sound and reliable information infrastructure. The literature on public administration (e.g., Bellamy & Taylor, 1998; Heeks, 1999) has also highlighted the pivotal role of ICTs in the delivery of public services.

Having underscored the impact of information infrastructure in a country on its e-government development, we now focus our efforts on explaining the criticality of governance in the context of e-government development. Governance, in broader terms, refers to the collection of processes and institutions that create conditions for ordered rule and collective

TABLE 1. Governance dimensions, description, and concepts measured.

Dimension	Description	Concepts measured[a]
Voice and accountability	Captures 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 a free media.	1. Accountability of public officials 2. Freedom of political participation 3. Transparency of economic policy
Political stability	Measures the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism.	1. Government stability 2. Internal and external conflicts 3. Frequency of political killings
Government effectiveness	Captures 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.	1. Institutional effectiveness 2. Bureaucratic quality 3. Quality of public administration
Regulatory quality	Captures the ability of the government to formulate and implement sound policies and regulations that permit and promote development.	1. Administrative regulations 2. Business regulatory environment 3. Trade policy
Rule of law	Captures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	1. Property rights 2. Law and order 3. Law enforcement
Control of corruption	Captures 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.	1. Anti-corruption policy 2. Public trust in financial honesty of politicians 3. Frequency of household bribery

[a]This is only a sample list. Please refer to the World Bank's Worldwide Governance Indicators Web page (http://info.worldbank.org/governance/wgi/index.asp) for the complete list.

action (Jessop, 1998; Kazancigil, 1998). According to the International Bank for Reconstruction and Development (IBRD, 2002), "strengthening governance institutions" is one of the key millennium development goals. As noted by Kaufmann, Kray, and Zoido-Lobotan (1999a), governance includes (a) the process by which governments are selected, monitored, and replaced; (b) the capacity of the government to effectively formulate and implement sound policies; and (c) the respect of citizens and the state for the institutions that govern economic and social interactions among them. According to the World Bank (1994), "good governance" is epitomized by (a) openness and predictability in policy making, (b) professionalism in bureaucracy, (c) accountability of government, and (d) participation of civil society in public affairs—all behaving under the rule of law. In line with Jessop's (1998) and Kazancigil's (1998) definition of governance, Kaufmann et al. (1999a) proposed six aggregated indices for measuring governance in a country. Table 1 presents a brief description of these six aggregated measures (or dimensions) and the concepts measured under each dimension.

As noted by Meso, Musa, Straub, and Mbarika (2009), the concept of governance is gaining increasing focus as a national-level construct owing to the rapidly growing domain of e-government within ICT research. Further, in their archival study of developing countries they indicated that governance has the potential to influence the kind of information technologies and systems that are being developed. Likewise, Madon et al. (2007) established that effective implementation of government-based information services for the provision of services is impacted by macro-level policy-making organs, thereby shaping the type of

system that is eventually implemented. Another study by Moon (2002) found that institutional factors significantly contributed to the adoption of e-government among municipalities. Norris and Moon (2005) showed that the level of adoption and sophistication of e-government systems are correlated with the presence of well-developed institutional factors. A study conducted by West (2004) highlighted the importance of institutional arrangements and governance mechanisms in ensuring e-government development. This has also been stressed by Von Haldenwang (2004) in his study. Similarly, McNeal, Tolbert, Moddberger, and Dotterweich (2003) established that legislative professionalism and professional networks are associated with extensive use of e-government. Most recently, Srivastava and Teo (2010) found that the quality of public institutions (in association with macro-economic stability) in a country is significantly related to the level of its e-government development.

According to Chadwick and May (2003), three models of governance are evident in the contemporary e-government implementations. First, in the managerial model, governance is seen as providing the citizenry with pertinent information services in an open, transparent, and timely fashion. Second, in the consultative model, governance is comprehended as (a) receiving feedback and opinions from the general public in a successful manner and (b) using the opinions in policy-making process to inform and/or influence future governmental actions. And finally, in the participatory model, governance is perceived as open communications (i.e., voicing of one's concerns), where the opinions are not necessarily directed only to government but to all players within the governance communications space. Taken together, as highlighted in a UN

survey on e-government (United Nations, 2008), governance revolves around governmental collective action "to advance the public good by engaging the creative efforts of all segments of society, thereby influencing the strategic actions of the stakeholders" (p. xvi).

While strengthening the concept of governance within e-government development is an important step toward improving the coordination of procedures and systems within and across government agencies and organizations (United Nations, 2008), it should be noted that governance is a broader construct than is perceived within e-government (Meso et al., 2009). That is, governance is not the exclusive preserve of national governments (Peters & Pierre, 1998). Rather, it entails multiple disparate players such as citizenry, commercial firms, and special interest groups, among others. This has also been noted by Larmour (1995), who finds that governance connotes either of two things: the "effective government," referring to the performance of a government (judged by parameters such as economic growth, poverty rate, and living standards), or the "freedoms" accruing to a country's citizens owing to their government's actions. In sum, the concept of governance is not only related to autonomous self-governing networks of institutions but also transcends government in a country (Meso et al., 2009). Governance is thus responsible for (a) creating an arena that allows the participants in all aspects of the economy to easily evolve, learn, and adapt (Meso et al., 2006) and (b) assuring political stability, economic stability, equitable distribution of power and national resources, and an environment conducive to the development of e-government.

According to Weill's (1991) phenomenon of "conversion effectiveness," governance in a country (as a complementary asset) will strongly influence the effect of information infrastructure on e-government development. When combined, a well-developed information infrastructure along with political stability, civil liberties, and democratization of the country as well as the accountability and transparency of sitting government complement each other to add to e-government development. Figure 1 depicts a model of relationships among information infrastructure, governance dimensions (as defined by Kaufmann et al., 1999a), and e-government development. In the ensuing sections we discuss the moderation effect hypotheses. Given that the link between information infrastructure and e-government development is already well established in the literature, we focus on the contingent role of governance dimensions in the positive association between information infrastructure and e-government development.

Moderating Influence of Voice and Accountability

Voice and accountability is an important dimension of governance because both citizens and government institutions have a role to play in delivering governance that works for the poor and enhances democracy. As noted by Goetz and Jenkins (2001, 2002), in a static model of voice and
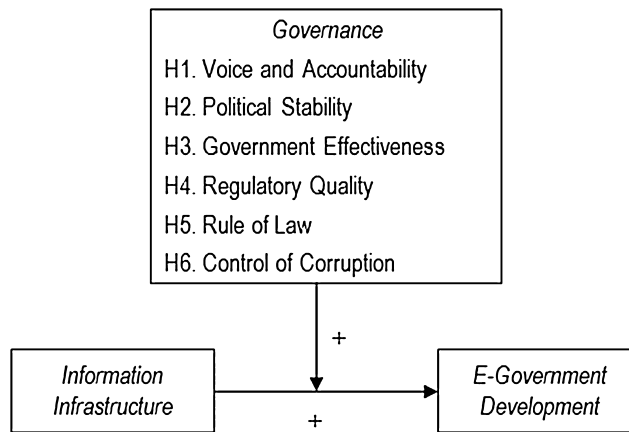

FIG. 1.   Research model.

accountability, voice refers to a variety of formal and informal mechanisms through which people express their preferences, opinions, and views, and accountability refers to the nature of the relationship between two parties (e.g., citizens and government officials). Further, accountability concerns the requirement that officials answer to stakeholders on the disposition of the their powers and duties, act on criticisms or requirements made of them, and accept responsibility for failure, incompetence, or deceit (United Nations Development Programme [UNDP], 1997). According to Kaufmann et al. (1999a), voice and accountability concerns the civil liberties and political rights of individuals, their freedom of expression, electoral participation, and independence of media. Citizens' ability to express and exercise their views has the potential to influence government priorities. Further, they have the capacity to shape governance processes by demanding transparency and accountability. Government in a country will be accountable to the needs and demands of its citizens only when they are clearly articulated (i.e., when their "voice" is effective). In the context of public-sector reform, "effective" voice and accountability mechanisms in a country have the potential to transform governmental actions and decisions by (a) demanding appropriate channels for deliberative, participatory decision-making in public policy and (b) addressing the demand-side aspects of public service delivery, monitoring, and accountability. Given this, it is appropriate to argue that such mechanisms will help in (a) strengthening the links between citizens and local government and (b) assisting local authorities and service providers to become more responsive and effective. In sum, when voice and accountability is effective in a country, the level of sophistication of online public services will progress beyond basic information publishing to transactional and connected service. Therefore, by drawing upon the resource complementarity perspective, it is logical to assume that information infrastructure, when combined with voice and accountability, will lead to higher levels of e-government development in a country. That is, effective voice and accountability in a country, according to Weill's

(1991) phenomenon of "conversion effectiveness," will influence the effect of information infrastructure on e-government development. Thus, we hypothesize:

H1: Voice and accountability positively moderates the relationship between information infrastructure and e-government development.

Moderating Influence of Political Stability

The political stability dimension concerns the likelihood of premature overthrow of government (e.g., coup d'état), domestic violence and terrorism, and forced discontinuities in policies (Kaufmann et al., 1999a). In short, it is a measure of the degree of turbulence in a country (Meso et al., 2006). A large number of theoretical studies suggest that political instability may adversely affect economic growth. For instance, Cukierman, Edwards, and Tabellini (1992) argued that governments in politically unstable and polarized countries are more likely to adopt inefficient or suboptimal policies, including the maintenance of inefficient tax systems, higher current government consumption, or the accumulation of larger external debts, which, in turn, adversely affect long-term economic growth. Sadowsky (1993, 1996), linking political stability with foreign direct investment (FDI) and with the risks associated with such investments, established that the greater the degree of turbulence, the more risky it is to invest in the country. Meso et al. (2006) emphasized that the level of political stability in a country has the potential to influence the level of engagement by local citizens in productive economic activity. That is, in situations of high political instability, citizens will be more likely to retire their productive resources, transfer them to more stable environments, or convert them into assets that will protect them against possible loss of life and wealth, thereby resulting in economic productivity loss. Such a situation is not limited to economic development and prosperity but also can affect other dimensions of national development such as social development and ICT-led developments.

For instance, Kasigwa, Williams, and Baryamureeba (2006, p. 78) in their discussion on ICTs and their sustainability in developing countries, indicated that "technological infrastructure and political stability are crucial factors for ICT-led development." Further, as ICT-led developments such as e-government are a major transformational exercise in change management, strong political leadership and stable political conditions are required for e-government applications to (a) overcome resistance and barriers, (b) change mindsets, (c) push through organizational change, and (d) sustain investment (Sudan, 2005). Another exploratory study by Al-Solbi and Al-Harbi (2008), specific to the context of Saudi Arabia, highlighted political instability in the Middle East as a critical determinant affecting the success of e-government in the country. Further, they generalized by arguing that such an instability in any region or country will reduce ICT-led investments and will have a negative impact on the ICT-led developments in that region or country. Hence, by drawing from the resource complementarity perspective, it is appropriate to argue that a well-developed information infrastructure combined with political stability will further a country's e-government development. Therefore, we posit:

H2: Political stability positively moderates the relationship between information infrastructure and e-government development.

Moderating Influence of Government Effectiveness

The goals and objectives of a government in a country can be multifarious, ranging from economic to social (Srivastava & Teo, 2007). Whereas economic objectives are concerned with making a nation (and its businesses) competitive, social objectives are related to enhancing the lives of its citizens by reducing poverty and social inequalities. It is widely acknowledged that a government can accomplish such objectives only when it is committed to its stakeholders (i.e., citizens and businesses) in delivering goods and services (Kaufmann et al., 1999a). In other words, governments should be "effective" in producing and implementing good policies and systems, and delivering public services online to achieve such objectives. A government will be instrumental in developing e-government initiatives and delivering online public services only when its (a) national institutions are effective; (b) resource allocation is efficient; (c) quality of public administration is effectual; (d) civil servants are competent; and (f) civil service is independent from political pressures (Kaufmann et al., 1999a).

For instance, a few years ago, in Singapore, applying for licenses was a daunting task for many startups and existing businesses. As most business activities commonly were under the purview of more than one agency, many businesses had to visit different agencies to apply for licenses, which resulted in significant opportunity and compliance costs for them. After the government launched the Online Business Licensing Service (a seamless system for businesses to apply for required licenses), applicants have to submit only one online form, and the approval processing time was reduced by 65%, from an average of 21 to 8 days (Teo & Koh, 2010). Such a development and level of sophistication in delivering online public service were possible only due to the government's effectiveness and its commitment to its citizens and businesses. Hence, by drawing from the resource complementarity perspective, it is logical to assume that information infrastructure, when combined with government effectiveness, will lead to higher levels of e-government development in a country. Thus, we posit:

H3: Government effectiveness positively moderates the relationship between information infrastructure and e-government development.

Moderating Influence of Regulatory Quality

Regulatory quality in a country is more focused on the policies themselves (Meso et al., 2006). According to

Kaufmann et al. (1999a), the regulatory framework is concerned with the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development. Similarly, Radaelli (2007) stated that improvements in regulatory performance include targets of burden reduction, cost effective regulation, and increased reliance on market-friendly alternatives to regulation. As noted in the new growth theory, formulation of policies concerning progrowth trade is a required condition for growth and development (Lucas, 1988; Romer, 1990). A recent large-scale study conducted by the World Economic Forum indicated that the regulatory environment in a country is a critical determinant that facilitates its ICT-led innovations and investments (Dutta & Mia, 2010). Similarly, Schware (2005) stressed the need for effective (or high-quality) regulatory frameworks for the adoption and use of e-applications. Further, he indicated that regulatory reforms establish a positive enabling environment for ICT-led developments in a country. Another study by Neto, Kenny, Janakiram, and Watt (2005) established that regulatory reforms can play an important role in promoting competition and ICT investment, causing ICT prices to drop and extending access to more advanced ICT services. Further, they indicated that differences in regulatory quality generally account for much of the gap in technology use between countries. Hence, when the quality of the regulatory framework is high, it is more likely that e-government services will progress beyond basic information publishing. That is, the level of sophistication of e-government will mature from emerging information services to transactional and connected services (United Nations, 2010). Hence, by drawing upon the resource complementarity perspective, it is appropriate to argue that a well-developed information infrastructure in a country with a strong regulatory framework will further e-government development. Therefore, we posit:

H4: Regulatory quality positively moderates the relationship between information infrastructure and e-government development.

Moderating Influence of Rule of Law

Rule of law concerns the extent to which agents have confidence in and abide by the rules of society (Kaufmann et al., 1999a). These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts. Together, these indicators measure the success of a society in developing an environment in which fair and predictable rules form the basis for economic and social interactions, and importantly, the extent to which property rights are protected. Meso et al. (2006) found that the rule of law lies at the crux of national development efforts. Further, they highlight that the legal framework to create an efficacious judiciary to administer the law "forms a quintessential part of governance" (p. 194). In a report prepared for the "World Summit on the Information Society," Schware (2005) stressed the need for harmonizing the legal frameworks across countries to ensure the cross-border interoperability of Internet-based applications. Satola, Sreenivasan, and Pavlasova (2004) made a similar observation in their research on 23 countries in the East Asia and Pacific region. Further, Neto et al. (2005) highlighted that ICT activity (in a country) depends significantly on appropriate legal frameworks (particularly respect for the "rule of law"). Another study by Guermazi and Satola (2005, p. 23) established that "it is critical for countries to adopt enabling legal environments that support e-development." As legal frameworks and laws provide a range of civil and criminal penalties and enforcement procedures, they are particularly essential to advance the e-government development agenda of a country. In a recent longitudinal study, Dutta and Mia (2010) noted that legal frameworks facilitate ICT penetration and ICT-led innovations. Hence, by drawing upon the resource complementarity perspective, it is logical that information infrastructure, when combined with effective legal frameworks, will lead to higher levels of e-government development in a country. Thus, we posit:

H5: Rule of law positively moderates the relationship between information infrastructure and e-government development.

Moderating Influence of Control of Corruption

Corruption, a complex term with various connotations (Ojha, Palvia, & Gupta, 2008), is believed to play a substantial role in explicating the growth and development of nations including the implementation and maturity of national e-strategy (Yoon & Chae, 2009) such as e-government. Jain (2001), in his review, defines corruption as acts in which the power of public officials is used for personal gains in a manner that contravenes the rules of the game. Acts of corruption, according to the United Nations Office on Drugs and Crime (UNODC, 2004), can take many forms, including bribery, embezzlement, theft, extortion, abuse of discretion, favoritism, exploiting conflicting interests, and improper political contributions. Corruption in a country buckles the reward structure spelled out by government regulations and institutions (Senior, 2004), and often leads to unproductive behaviors (Rodriguez, Uhlenbruck, & Eden, 2005). The presence of corruption often clearly indicates a lack of respect by both the corrupter (e.g., citizen or private firm) and the corrupted (e.g., public official or politician) for the rules that govern their interactions, and hence represents a failure of governance (Meso et al., 2006). Klitgaard (1988) argues that corruption is a problem of asymmetric information and incentives, which can be explained by the principal–agent–client model. According to this model, the principals are the honest public officials within a government, in charge of public servants (the agents) responsible for service delivery to businesses and citizens (the clients). The model predicts

that corruption is more likely to occur when a public official possesses access to a monopoly, has discretion in administering it, and operates with a lack of accountability. That is, the problem of corruption arises in situations where there is a problem of asymmetric information, in which the agents know far more about the administration than either the principals or the clients. In such situations, the agents exploit their position as go-betweens and take advantage of the power entrusted to them to act more in their own interest, commonly through bribery, extortion, fraud, nepotism, or embezzlement (UNDP, 2008). An important implication of this model is that, in order to reduce corruption, it is crucial to restructure the principal–agent–client relationship to alter the amount of monopolistic control, discretion, and accountability with which the agent is endowed (Klitgaard, 1988).

It is widely acknowledged that control of corruption in a country can facilitate its growth and development by strengthening institutions, lowering business costs, encouraging domestic and foreign investments, and weakening a perverse incentive system. On the other hand, a country in which corruption is endemic is usually plagued with widespread economic inefficiency (UNDP, 2008). Studies have shown that the existence of corruption in a country will hinder the growth of e-government (and other ICT-led developments) and will affect its level of sophistication (or maturity). For instance, Yoon and Chae (2009, p. 34) indicated that "corruption actually lowers the effectiveness of national e-strategy and its implementation." Kim, Kim, and Lee (2009) and Lio, Liu, and Ou (2011) have suggested that countries should embed effective strategies for fighting corruption in the design of the e-government system and stressed the need for stronger leadership in implementing such systems. Few studies have acknowledged that corruption might hinder the introduction of ICTs (e.g., Oruame, 2008; Quibria, Ahmed, Tschang, & Reyes-Macasaquit, 2003). In sum, when the level of control of corruption in a country is higher, the level of its e-government development will be higher. Further, when combined, a well-developed information infrastructure in a country with effective control of corruption will spur e-government development. Therefore, we posit:

> H6: Control of corruption positively moderates the relationship between information infrastructure and e-government development.

Control Variables

Control variables are used to account for factors other than the theoretical constructs of interest, which could explain variance in the dependent variable. In our study, it is likely that variables other than information infrastructure and governance dimensions could affect e-government development. Prior research has found that the economic condition of a country (e.g., Singh et al., 2007), quality of human capital (e.g., Siau & Long, 2009; Srivastava & Teo, 2008, 2010), and regional differences (e.g., Siau & Long,

2006) will affect e-government development. Therefore, we controlled for their effects in our study.

Research Design

To test the hypotheses, we gathered archival data (for each of the main constructs) for two reasons. First, collecting large-scale primary data from over 150 countries is constrained by the amount of resources and time available for conducting such research (Meso et al., 2009; Srivastava & Teo, 2008). Second, archival data, as suggested by some researchers (e.g., Järvenpää, 1991), offers several advantages, namely: (a) easy reproducibility; (b) ability to generalize the results arising from larger data sets (Kiecolt & Nathan, 1985); and (c) robust to the threat of common method bias (Woszczynski & Whitman, 2004).

Hypotheses were tested via a cross-sectional analysis of 178 countries (see the Appendix for the list of countries). Given the initial investments in information infrastructure and governance, our exhaustive review of the existing literature examining the phenomenon of e-government development (at country-level) indicated that there were no studies explicitly examining the time taken for e-government development to reach maturity (or level of sophistication). While this may be due to the evolutionary nature of the e-government development process (Siau & Long, 2006), we note that most extant studies do not lag independent and dependent variables (e.g., Siau & Long, 2009; Singh et al., 2007; Srivastava & Teo, 2008, 2010). However, country-level studies from the reference disciplines (e.g., Robertson & Watson, 2004) utilizing cross-sectional data for empirical validation suggest the need for lagging the independent and dependent variables at least by a year. Hence, due to the varying speed at which information infrastructure and governance affect e-government development in a country, and consistent with the suggestion provided by Robertson and Watson (2004) for obtaining consistent estimates, we lagged the independent and moderating variables by two years prior to the base year.

Operationalization of Constructs

As shown in our research model (Figure 1), there are eight main constructs (excluding the control variables) in this study: information infrastructure; voice and accountability; political stability; government effectiveness; regulatory quality; rule of law; control of corruption; and e-government development. The independent construct, information infrastructure, was measured using the telecommunications infrastructure index. This index, taken from the UN E-government Survey Report (United Nations, 2008) is a composite of five primary indicators: PCs/100 persons; Internet users/100 persons; telephone lines/100 persons; mobile phones/100 persons; and broadband/100 persons. To compute this index, the UN followed three steps. First, based on the scores of the indicators (for countries), a maximum and minimum value was selected for each of the five

indicators. Second, the country's relative performance (for each indicator) was measured by a value between 0 and 1 based on the formula: indicator value = (actual value − minimum value) / (maximum value − minimum value). Third, the telecommunications infrastructure index was constructed as a composite measure (by assigning 20% weight for each variable) based on the formula: infrastructure index = 1/5 (PC index) + 1/5 (Internet user index) + 1/5 (telephone line index) + 1/5 (mobile user index) + 1/5 (broadband index). The values for this index ranged between 0 and 1, with the higher values corresponding to the higher levels of information infrastructure. This index has been used in past academic studies such as that by Srivastava and Teo (2008, 2010).

The moderating construct, governance, was operationalized using six aggregated measures of governance (with a value between −2.5 and 2.5, with the higher values corresponding to better governance) originally presented by Kaufmann et al. (1999a). These six measures have since been adopted by the World Bank and employed as indices of governance in the world development reports (IBRD, 2002).

In a separate article published in the same year, Kaufmann et al. (1999b) showed that aggregated variables are richer and better predictors of governance than the individual governance measures that are currently published annually by a wide group of organizations. Further, they demonstrated that aggregating individual variables allows for the coverage of many more countries and for the standardization of the resulting measures, thereby facilitating cross-country comparative research. Data for these measures were taken from the World Bank and are for the year 2008. These measures have been used in past studies such as that by Meso et al. (2009).

The dependent construct, e-government development, was measured by the online service index (previously called the Web measure index). This index, taken from the UN E-government Survey Report (United Nations, 2010) is an indicator of the sophistication and development of e-government Web sites of countries, and is based on the UN's four-stage model of online service development: emerging presence, enhanced presence, transactional presence, and connected presence. Countries were coded in consonance with what they provided online and the stage of e-government evolution they were presently in. Hence, as a country migrated upward through the various stages, it was ranked higher in the online service index. The values for this index ranged between 0 and 1, with the higher values corresponding to the higher level of e-government development. The value for a given country is equal to the total number of points scored by that country less the lowest score for any country divided by the range of values for all countries in the survey (United Nations, 2010). This index (and its previous version) has been used in past studies such as those by Siau and Long (2006, 2009) and Srivastava and Teo (2008, 2010).

The control variable, economic condition of a nation, according to Porter (2005), depends both on the value of nation's products and services, measured by the prices they can command in open markets, and on the efficiency with which they are produced. Hence, consistent with other studies (e.g., Srivastava & Teo, 2010), we used Porter's productivity paradigm for operationalizing economic condition in terms of GDP per capita (adjusted for purchasing power parity, PPP), the values (for the year 2008) which were obtained from the International Monetary Fund's (IMF) World Economic Outlook Database. The other control variable, human capital, was measured using the human capital index (previously called the education index) with a value running between 0 and 1 (with the higher values corresponding to the higher levels of human capital). This index, taken from the UN E-government Survey Report (United Nations, 2008), is a composite of the adult literacy rate and the combined primary, secondary, and tertiary gross enrollment ratio, with two thirds of the weight given to adult literacy and one third to the gross enrollment ratio. Adult literacy is defined as the percentage of people aged 15 years and above who can, with comprehension, read and write a short simple statement on their everyday life; combined primary, secondary, and tertiary gross enrollment ratio is the total number of students enrolled at the primary, secondary, and tertiary level, irrespective of age, as a percentage of the population of school age for that level. This index has been used in past academic studies such as that by Srivastava and Teo (2008). Finally, the third control variable, regional difference, was operationalized as the country-level difference across various regions of the world. Based on the UN's regional groupings, we coded countries into five groups (i.e., Americas [e.g., United States]; Europe [e.g., Denmark]; Africa [e.g., Congo]; Asia [e.g., India]; and Oceania [e.g., Australia]).

It should be noted that the reporting agencies (the UN and World Bank) followed rigorous procedures for ensuring the reliability and validity of data. For instance, while forming the online service index, the UN's assessment involved identification of the national and ministerial Web sites by the research team following a uniform set of guidelines (e.g., using a variety of search engines to locate the most relevant site when no responses were received from the Member States). The research team was fully equipped to handle the official languages of the UN. In addition, translators provided assistance as necessary. Researchers were instructed and trained to scrutinize the Web sites very closely. Further, a Web-based information management system was used by the research team for managing the survey effort and tracking results. To ensure that the Web sites were rated with maximum objectivity and accuracy, the second-level quality assurance group validated the data received from the primary research team. This resulted in adjustment of scores for a number of countries.

The World Bank also followed rigorous procedures for ensuring reliability and validity. First, multiple sources were used to gather the governance data. This included surveys of households and firms, commercial business information providers, nongovernmental organizations, and public-sector

organizations. A three-step procedure was followed to construct each of the six aggregate governance measures: (a) assigning data from individual sources to the six aggregate indicators, (b) preliminary rescaling of the individual source data to run from 0 to 1, and (c) using an unobserved components model (a statistical tool) to make the 0–1 rescaled data comparable across sources, and then to construct a weighted average of the data from each source for each country.

Analysis and Results

Descriptive Statistics and Correlations

Table 2 presents the descriptive statistics and correlations for all variables in the study. From the table, it is evident that most correlations among variables were significant at $p < .001$. Further, as most correlations among variables were below the threshold value of 0.8, the concern for multicollinearity would be minimal (Gujarati, 2003; Gujarati & Porter, 2009). Although the correlations between (a) government effectiveness and regulatory quality ($r = 0.84$) and (b) regulatory quality and rule of law ($r = 0.82$) indicate a potential for multicollinearity, our use of a robust method of moderated multiple regression to test the hypotheses generally mitigates any undue influences (Hair, Anderson, Tatham, & Black, 2006; Husted, 1999). Further, considering that these variables measure distinct parameters (Kaufmann et al., 1999a) and are used as standard measures of governance quality in the world development reports (IBRD, 2002), the high correlations may not seriously affect the results. Nevertheless, we followed up with the diagnostic statistical collinearity tests that measure variance inflation factor (VIF). VIF assesses the effect that the other independent (and moderating) variables have on the standard error of a regression coefficient (Hair et al., 2006). That is, it measures the degree to which collinearity among the predictors degrades the precision of an estimate. The results of these tests revealed that our VIFs ranged from 1.42 to 3.01 (all tolerance levels above 0.33). According to Fox (1991), a VIF of above 4.0, or a tolerance level below 0.25, may

indicate the potential for multicollinearity; thus, the concern in our model appeared to be minimal.

Hypotheses Testing

We used moderated multiple regression, a hierarchical regression analysis technique for testing the research hypotheses, as it is an established method for testing the interaction effects and has been used in many similar studies in the fields of strategic management, information systems, international business, and macroeconomics. We adopted the method recommended by Aiken and West (1991) for examining interactions in regression methods where we first "centered" or "linearly rescaled" each of the two variables by subtracting the mean from each country's score for each variable to reduce the effect of multicollinearity between the interacting term and the main effect. All interaction terms were assessed simultaneously so that their effects could be seen in the context of the overall model (i.e., in the presence of other interaction effects) (Kankanhalli, Tan, & Wei, 2005). Specifically, as a first step, the control variables economic condition, human capital, and regional difference were entered into the regression equation. In steps 2 and 3, we entered independent variables (and moderating variables) and interaction terms, respectively, into the regression equation. A summary of our results is presented in Table 3. The R^2 value of 0.71 and adjusted R^2 value of 0.68 ($F = 24.58$, $p < .001$) indicated that the overall model was effective in explaining the variance in e-government development. The change in R^2 value between steps 2 and 3 of regression was 0.04 (change in $F = 9.12$, $p < .01$), indicating that the outcome of the third step (i.e., testing of moderation effects) could be interpreted.

As shown in Table 3 (step 2), information infrastructure had a strong positive association with e-government development ($\beta = 0.49$, $p < .001$). Further, of the six governance dimensions, whereas political stability ($\beta = 0.23$, $p < .05$), government effectiveness ($\beta = 0.32$, $p < .01$), and rule of law ($\beta = 0.43$, $p < .001$) had significant positive relationships with e-government development, control of corruption

TABLE 2. Descriptive statistics and correlations.

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Econ Cond[a]	8.28	1.29	–									
2. Hum Cap	0.78	0.18	0.69	–								
3. Reg Diff	2.75	1.16	−0.27	−0.26	–							
4. Info Infra	0.21	0.21	0.67	0.67	−0.28	–						
5. Voc and Acct	−0.08	0.98	0.57	0.49	−0.46	0.60	–					
6. Pol Stable	−0.10	0.96	0.64	0.53	−0.21	0.59	0.60	–				
7. Govt Effect	−0.03	0.97	0.65	0.63	−0.23	0.73	0.66	0.67	–			
8. Reg Qual	−0.03	0.96	0.68	0.60	−0.30	0.69	0.69	0.63	0.84	–		
9. Rule Law	−0.08	0.99	0.67	0.58	<u>−0.17</u>	0.70	0.67	0.65	0.75	0.82	–	
10. Corrupt Ctrl	−0.04	1.00	0.63	0.54	−0.24	0.70	0.67	0.61	0.73	0.72	0.75	–
11. E-Gov Dev	0.29	0.20	0.65	0.59	<u>−0.16</u>	0.64	0.48	0.32	0.61	0.61	0.63	0.59

[a]Log transformed variable; $N = 178$; All correlations (except those underlined) are significant at $p < .01$ (2-tailed) and underlined correlations are significant at $p < .05$ (2-tailed).

TABLE 3. Regression results.

Variables and Statistics	β^a	Hypothesis Test
Step 1: Controls		
Econ Cond[b]	0.48***	
Hum Cap	0.22*	
Reg Diff	0.01	
R^2	0.44	
Adjusted R^2	0.43	
F	46.88***	
Step 2: Main Effects		
Info Infra	0.49***	
Voice and Acct	−0.16	
Pol Stabe	0.23*	
Govt Effect	0.32**	
Reg Qual	0.02	
Rule Law	0.43**	
Corrupt Ctrl	−0.28*	
R^2	0.67	
Adjusted R^2	0.65	
F	33.70***	
R^2 Change	0.23	
F Change	13.18***	
Step 3: Interaction Effects		
Info Infra × Voice and Acct	−0.35**	H1 was not supported
Info Infra × Pol Stabe	0.25*	H2 was supported
Info Infra × Govt Effect	0.38**	H3 was supported
Info Infra × Reg Qual	−0.14	H4 was not supported
Info Infra × Rule Law	0.45***	H5 was supported
Info Infra × Corrupt Ctrl	−0.38**	H6 was not supported
R^2	0.71	
Adjusted R^2	0.68	
F	24.58***	
R^2 Change	0.04	
F Change	9.12**	

[a]The betas reported are based on standardized coefficients.
[b]Log transformed variable.
$N = 178$. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$ (2-tailed).

($\beta = -0.28$, $p < .05$) had a significant negative relationship. Voice and accountability ($\beta = -0.16$, n.s.) and regulatory quality ($\beta = 0.02$, n.s.) had insignificant relationships with e-government development.

Turning now to the contingent effect of governance dimensions on the relationship between information infrastructure and e-government development, of the six interaction terms, five were significant (Table 3, step 3). That is, the relationship of information infrastructure with e-government development was contingent on voice and accountability ($\beta = -0.35$, $p < .01$), political stability ($\beta = 0.25$, $p < .05$), government effectiveness ($\beta = 0.38$, $p < .01$), rule of law ($\beta = 0.45$, $p < .001$), and control of corruption ($\beta = -0.38$, $p < .01$). The relationship of information infrastructure with e-government development was not contingent on regulatory quality ($\beta = -0.14$, n.s.).

To determine if the patterns characterizing the significant interactions conform to the directions proposed in the research hypotheses, we graphed the interaction effects (Figure 2a–e). This procedure was recommended by Cohen and Cohen (1983) for all interaction cases. In addition, to examine the consistency of the proposed direction throughout the range of independent variable, we performed simple slope analysis as recommended by Aiken and West (1991). This analysis reflects whether the slopes relating the independent and dependent variables differ from zero.

Figure 2a shows the disordinal (or cross-over) interaction of voice and accountability on the relationship between information infrastructure and e-government development. While there was a significant positive relationship between information infrastructure and e-government development at low levels of voice and accountability, there was an insignificant positive relationship at high levels of voice and accountability. Further, it is evident from the figure that there was little or no difference in e-government development values between low and high levels of voice and accountability when information infrastructure was low, but there was a substantial difference in e-government development values between low and high levels of voice and accountability in favor of low voice and accountability when information infrastructure was high. Confirming this, a simple slope analysis revealed that when voice and accountability was high, the relationship of information infrastructure with e-government development was positive and nonsignificant (slope = 0.21, $t = 1.13$, n.s.). Also, when voice and accountability was low, the relationship between information infrastructure and e-government development was positive and significant (slope = 0.84, $t = 7.83$, $p < .0001$). This interaction contradicts H1, which suggested that a high voice and accountability would be associated with the steeper positive slope. Hence, H1 is not supported.

Figure 2b shows the disordinal interaction of political stability on the relationship between information infrastructure and e-government development. Whereas there was a significant positive relationship between information infrastructure and e-government development at high levels of political stability, there was an insignificant positive relationship at its low levels. Further, it is evident from the figure that there was little difference in e-government development values between low and high levels of political stability when information infrastructure was low, but there was a substantial difference in e-government development values between low and high levels of political stability in favor of high political stability when information infrastructure was high. A simple slope analysis revealed that when political stability was high, the relationship of information infrastructure with e-government development was positive and significant (slope = 0.77, $t = 9.05$, $p < .0001$). However, when political stability was low, the information infrastructure and e-government development relationship was positive but insignificant (slope = 0.27, $t = 1.47$, n.s.). This interaction is in line with H2, which suggested that high political stability would be associated with the steeper positive slope. Hence, H2 is supported.

Figure 2c shows the ordinal interaction of government effectiveness on the relationship of information infrastructure with e-government development. Whereas information
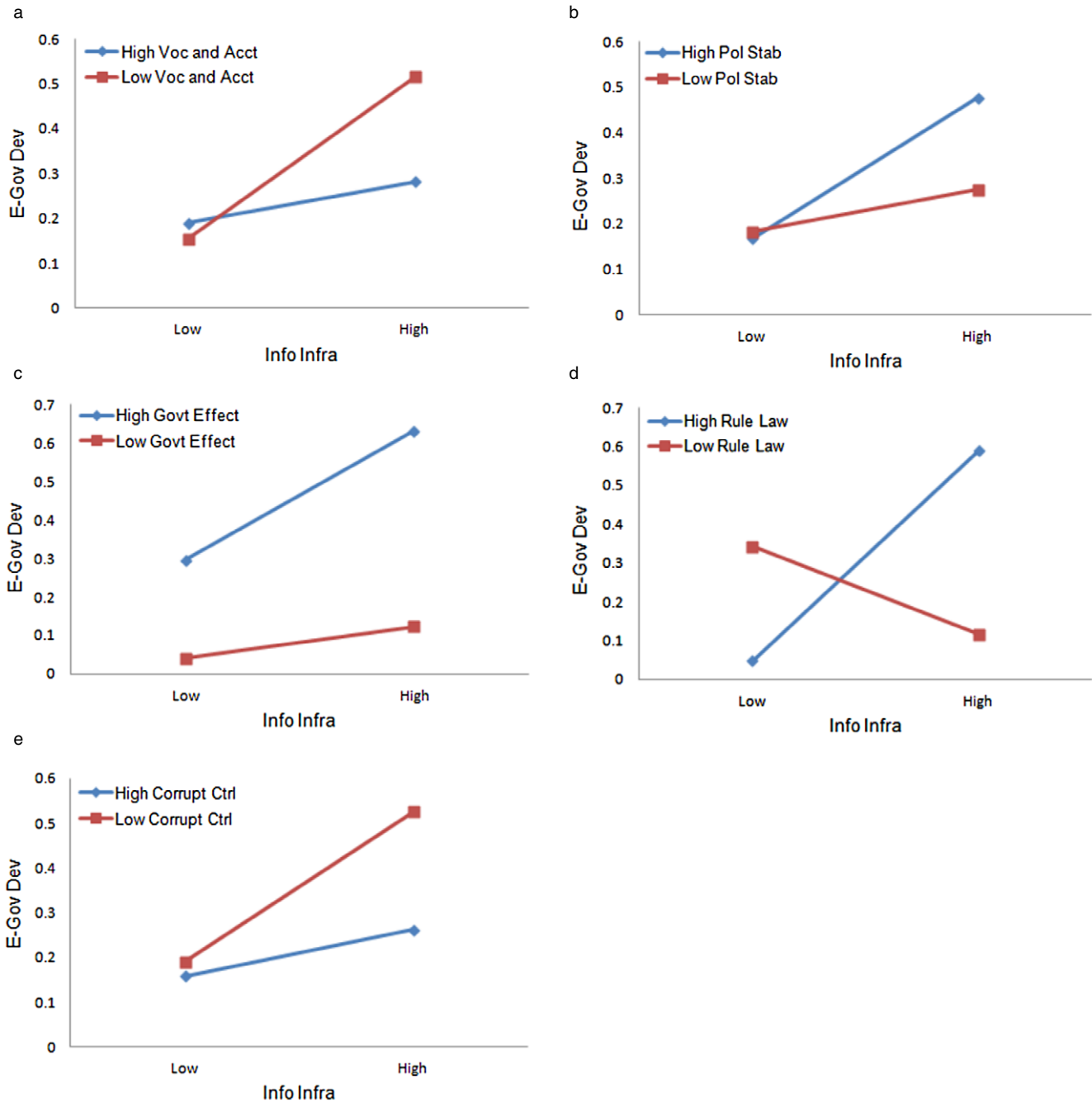
FIG. 2. (a) Moderating influence of voice and accountability. (b) Moderating influence of political stability. (c) Moderating influence of government effectiveness. (d) Moderating influence of rule of law. (e) Moderating influence of control of corruption. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

infrastructure strongly predicted e-government development in the positive direction at high levels of government effectiveness, the association was weakly positive at its low levels. In addition, it is evident from the figure that there was little difference in e-government development values between low and high levels of government effectiveness when information infrastructure was low, but there was a substantial difference in e-government development values between low and high levels of government effectiveness in

favor of high government effectiveness when information infrastructure was high. Confirming this, a simple slope analysis revealed that when government effectiveness was high, the relationship of information infrastructure with e-government development was positive and significant (slope = 0.80, $t = 3.58$, $p < .001$). On the other hand, when government effectiveness was low, the relationship of information infrastructure with e-government development was positive but insignificant (slope = 0.21, $t = 0.93$, n.s.). This

interaction is in line with H3, which suggested that high government effectiveness would be associated with the steeper positive slope. Therefore, H3 is supported.

Figure 2d shows the disordinal interaction of rule of law on the relationship between information infrastructure and e-government development. A simple slope analysis revealed that when rule of law was high, the relationship of information infrastructure with e-government development was positive and significant (slope = 1.30, $t = 4.30$, $p < .0001$). When the rule of law was low, the relationship of information infrastructure with e-government development was negative and nonsignificant (slope = −0.48, $t = −1.73$, n.s.). This plot indicates that the positive relationship of the interaction of information infrastructure and rule of law on e-government development was exhibited only at high levels of rule of law. In other words, information infrastructure was more strongly related to e-government development of nations with high levels of rule of law. Hence, H5 is supported.

Figure 2e shows the ordinal interaction of control of corruption on the relationship between information infrastructure and e-government development. As shown in the figure, whereas there was a significant positive relationship between information infrastructure and e-government development at low levels of control of corruption, there was an insignificant positive relationship at high levels of control of corruption. It is also evident from the figure that there was little difference in e-government development values between low and high levels of control of corruption when information infrastructure was low, but there was a substantial difference in e-government development values between low and high levels of control of corruption in favor of low control of corruption when information infrastructure was high. Confirming this, a simple slope analysis revealed that when control of corruption was high, the relationship of information infrastructure with e-government development was positive and insignificant (slope = 0.24, $t = 0.94$, n.s.). Also, when control of corruption was low, the information infrastructure and e-government development relationship was positive and significant (slope = 0.78, $t = 4.95$, $p < .0001$). This interaction contradicts H6, which suggested that a high control of corruption would be associated with the steeper positive slope. Therefore, H6 is not supported.

Finally, among the three control variables, while economic condition ($\beta = 0.48$, $p < .001$) and human capital ($\beta = 0.22$, $p < .05$) were significantly associated with e-government development in the positive direction, regional difference ($\beta = 0.01$, n.s.) had no significant influence. In the ensuing section, we discuss our findings in detail.

Discussion

Motivated by the fact that there is limited quantitative empirical research examining the phenomenon of e-government development from a macro perspective (i.e., cross-country level), the purpose of this study was to examine the contingent role of governance dimensions on the relationship between information infrastructure and e-government development. In particular, by drawing upon the resource complementarity perspective of the RBV of a firm and by utilizing Weill's (1991) concept of "conversion effectiveness," we posited that, when combined, a "well-developed" information infrastructure in a country along with "good" governance facilitate e-government development. Testing the hypothesized model utilizing archival data from 178 countries led to several interesting findings that deserve mention.

First, although not hypothesized explicitly, the direct effect of information infrastructure on e-government development is consistent with prior research (e.g., Siau & Long, 2009; Srivastava & Teo, 2010). This result suggests that when a country's investment in information infrastructure increases, it should be able to raise the scope and enhance the quality of online public services. Further, our results indicated that not all dimensions of governance contribute to the development of e-government. Of six dimensions of governance, only political stability, government effectiveness, and rule of law were significantly associated with e-government development in a positive direction. Among them, rule of law seemed to be strongly related to e-government development followed by government effectiveness and political stability. This result suggests that rule of law is not only important for a nation's socioeconomic development (Meso et al., 2006) but also lies at the crux of ICT-led developmental efforts. Further, the finding concerning government effectiveness indicates that a country's e-government development will progress and reach the stage of maturity only when its national institutions are effective. Similarly, for the public sector to transform from a bureaucratic organization to an anticipative and responsive government, political conditions must be stable, which in turn will lead to e-government success. These observations are as refreshing as they are informative. Past studies (e.g., Das, Singh, & Joseph, 2011; Singh et al., 2007) indicate that governance has negative or no impact on e-government development and maturity. It should be noted that these studies, unlike the current study, view governance as a single dimensional construct rather than a multidimensional phenomenon. However, our findings indicate that governance does matter in the context of e-government development. That is, if appropriate governance dimensions are strengthened, they will stand to leverage the e-government development of member nations. This is one reason why governance and the strengthening of governance institutions has become one of the key millennium development goals for international development agencies (IBRD, 2002).

Turning now to the complementary roles of governance, as revealed by the findings, voice and accountability, political stability, government effectiveness, rule of law, and control of corruption were the principal moderating variables used to explain governance. Further, whereas political stability, government effectiveness, and rule of law moderated the relationship of information infrastructure with

e-government development in a positive direction, voice and accountability and control of corruption moderated the relationship negatively. Among the positive moderations, rule of law (as in main effects) again seemed to lie at the crux of e-government developmental efforts. An efficient legal framework in a country will provide a platform for its citizens to participate in the resolution of demanding situations, without lessening their security (Meso et al., 2006). Moreover, increased access to information through ICT infrastructure combined with a robust legal framework induces further development of e-government systems. In sum, once the rule of law is established, it will unambiguously spur innovations leading to higher levels of e-government development. Following rule of law, government effectiveness seemed to strengthen the effect of information infrastructure on e-government development. This indicates that government that is effective and committed to its citizens and businesses to deliver public goods and services, when combined with robust information infrastructure, will induce further development of e-government in that country. Finally, political stability also strengthened the relationship of information infrastructure to e-government development, suggesting that in a politically stable environment, information infrastructure will provide a medium for inducing e-government development. Further, in such environments, information infrastructure will spur the growth of e-government by enhancing the delivery of public services.

Interestingly, voice and accountability affected the relationship of information infrastructure and e-government development in a negative direction. This could be due to its possible dual effect. Previous literature suggests that voice and accountability in terms of greater participation, often involving multiple and competing voices, can endanger freedom and rights, impede governability, and jeopardize pluralism (Malik & Waglé, 2002). In addition, there is a risk that increased participation may reduce the quality of dialog, thereby undermining the governance process and delaying e-government reaching maturity. This finding suggests that there could be other factor(s) that may strengthen the contingent role of voice and accountability on the relationship between information infrastructure and e-government development. For instance, "ability of institutions" to handle multiple and competing voices may be one factor that could help enhance the potential benefits of voice and accountability on the relationship between information infrastructure and e-government development. That is, in contexts where institutions are relatively strong, greater voice and accountability, when combined with sound information infrastructure, may lead to increased e-government development.

In a similar vein as voice and accountability, control of corruption also moderated the information infrastructure and e-government relationship in a negative direction. That is, although control of corruption was high, the effect of information infrastructure on e-government development weakened. Although this finding is counterintuitive, previous research has found that corruption could be beneficial. It

has occasionally been acknowledged that not all forms of corruption are the same, and that some corruption may actually be good. For instance, Huntington (1968, p. 69) indicated that "in terms of economic growth, the only thing worse than a society with a rigid, overcentralized, dishonest bureaucracy is one with a rigid, overcentralized, and honest bureaucracy." A study by Leff (1964) highlighted that corruption could raise growth either as "speed money" to bypass bureaucratic rules or as a sort of piece rate pay for efficiency. Additionally, Lui (1985) showed that bribery can be efficient in a queuing model if agents with higher values of time can use bribes to obtain a better place in line. Similarly, Acemoglu and Verdier (1998) established that corruption introduces efficiency in the economy and affects economic growth positively. Recently, Egger and Winner (2005), working with a sample of 73 countries in the 1995–1999 time period, found a clear positive relation between corruption and FDI.

Taken together, while these findings indicate that corruption can have more than one dimension (e.g., good corruption and bad corruption), a deeper look at our measures on control of corruption reveals that there is no such distinction made by Kaufman et al. (1999a) when computing the control of corruption index. Interpreted in this light, our finding entails two things. First, corruption may act as a lubricant or facilitator enhancing the e-government development process. Second, other enabling factors such as institutional quality in a country may leverage the effect of control of corruption on the relationship between information infrastructure and e-government development. For instance, Mironov (2005) classified corruption into two types: systematic corruption (or bad corruption) and idiosyncratic corruption (or good corruption) and established that (a) systematic corruption (or corruption that is correlated with poor institutions) will always have a negative effect on development; and (b) idiosyncratic corruption (which captures variation in anticorruption policies, and is not correlated with poor institutions) will be positively associated with productivity (especially in countries with poor regulations).

Finally, the relationship of information infrastructure with e-government development was not contingent on regulatory quality, possibly because the effect of regulatory quality on information infrastructure and e-government development relationship may have been masked by stronger predictors with which it was correlated.

In sum, the above findings suggest that our assumptions about information infrastructure and its impact on e-government development are justifiably supported by governance dimensions. As a key catalyst, governance has the ability to precipitate e-government development, and understanding its pivotal role will allow for further enhancement of e-government development.

Implications, Limitations, and Future Research

Our study has several important theoretical implications. It contributes to the knowledge base of resource

complementarity perspective of RBV in two ways. First, in contrast to many past studies that have implicitly assumed that assets could have direct effects on competitive advantage, our study draws upon the resource complementarity perspective and posits that a resource (here, information infrastructure) produces greater returns if certain other resources (here, governance) are present than it would produce by itself. Second, within the limited work that has been undertaken to investigate the effects of complementarities on competitive advantage (Ravichandran & Lertwongsatien, 2005), most studies are at the organizational level. We extend this firm-level argumentation to a macro-level (i.e., country-level) and establish its usefulness in the empirical context of e-government development.

Our study also contributes to the knowledge base of e-government in three ways. First, while the link between information infrastructure and e-government development is well established in prior literature, assessing its boundary conditions is not covered in current research. Given this, we evaluate its boundary conditions by examining the contingent role of governance. A second related contribution is that by assessing the complementary role of governance dimensions, our study provides a basis for the development of ICT-related e-government maturity assessment tools for managerial use. Third, although a great deal of research has been conducted in the context of e-government development, most studies are "micro" in orientation, focusing on "particular aspects" of e-government development with reference to "particular region or country." Our study is among the few large-scale empirical studies making innovative use of publicly available data.

From a practical standpoint, this study has several implications. By identifying the governance dimensions that would affect the relationship of information infrastructure on e-government development, our study not only helps practitioners, policy makers, and public administrators to understand why differing levels of e-government development continue to prevail despite the investments in information infrastructure, but also shows directions to increase the levels of e-government development by effectively managing the governance dimensions. Specifically, the implications from the interaction plots are insightful to policy makers, practitioners, and public administrators, and indicate that they should pay increased attention in managing governance alongside the investments in information infrastructure.

As with any study, a few limitations should be mentioned. First, we used archival data obtained from different sources (as indicated above). Although primary data might have given us better control over the definition of variables, it is less feasible for a small group of researchers to undertake large-scale cross-country data collection given the limited amount of resources and time. However, considering that the data we use in this study have been collected by reputable and authorized organizations and the indices have been formulated using suitable statistical procedures (e.g., use of multiple respondent expert surveys in each nation and cor-

recting the internal consistency before index calculation) to ensure the reliability and validity of the instrument, relying on these secondary sources provides a cost-effective way for of conducting our study. Second, we analyzed data only from the countries commonly available in all the primary sources. For instance, we could not include countries like Cuba, Hong Kong, and Taiwan as these countries were not commonly available in all the data sources. However, given that we have only eight main variables and a sample size of 178, discarding a few countries may not make a significant difference in the results, since the multiple regression statistical technique with a sample size of 100 and above will detect fairly small R^2 values (10–15%) with up to 10 independent variables and a significance level of .05 (Hair et al., 2006). Despite these potential limitations, our study is one of the few studies with macro-level orientation striving to address the knowledge gaps described in the earlier sections of this article.

Future research may focus on several directions. First, given the unexpected finding concerning the contingent role of voice and accountability and control of corruption, future researchers may consider identifying ways to realize the benefits from them. Specifically, they may consider studying under what conditions, voice and accountability and control of corruption will strengthen the effect of information infrastructure on e-government development. Second, researchers may consider extending our cross-sectional study to a longitudinal (panel) study (as more data become available), which would help to examine the issues of temporal precedence (leads/lags between independent, moderating, and dependent variables), as well as the evolution of e-government development as a function of the levels and trends in the independent and moderating variables. Third, while our study has mainly focused on "objective technology" available with public-sector organizations (i.e., e-government development), future studies may consider extending our study in the context of private-sector organizations (i.e., e-business development). A comparison from this perspective would be interesting and might add value to both theory and practice. Fourth, future researchers, in addition to reexamining our study and confirming the findings, may also identify other complementary resources (e.g., macroeconomic stability and public institutions) on which the main effects are contingent.

In conclusion, our results indicate that governance contributes to shaping the influence of information infrastructure on a nation's e-government development. In this regard, ICT policies for e-government development need to address and include actions that enhance governance, thereby leveraging the effect of information infrastructure on e-government development.

References

Acemoglu, D., & Verdier, T. (1998). Property rights, corruption and the allocation of talent: A general equilibrium approach. Economic Journal, 108(450), 1381–1403.

Aiken, L.S., & West, S.G. (1991). Multiple regression: Testing and interpreting interactions. Thousand Oaks, CA: Sage.

Al-Solbi, A.N.H., & Al-Harbi, S.H. (2008). An exploratory study of factors determining e-government success in Saudi Arabia. Communications of the IBIMA, 4(25), 188–192.

Amit, R., & Schoemaker, P.J.H. (1993). Strategic assets and organizational rent. Strategic Management Journal, 14(1), 33–46.

Barney, J.B. (1991). Firm resources and sustainable competitive advantage. Journal of Management, 17(1), 99–120.

Bellamy, C., & Taylor, J.A. (1998). Governing in the information age. Buckingham, UK: Open University Press.

Chadwick, A., & May, C. (2003). Interactions between states and citizens in the age of the internet: 'e-government' in the United States, Britain and the European Union. Governance, 16(2), 271–300.

Chan, C.M.L., Hackney, R., Pan, S.L., & Chou, T.Z. (2011). Managing e-government system implementation: A resource enactment perspective. European Journal Information Systems, 20(5), 529–541.

Chan, C.M.L., Lau, Y., & Pan, S.L. (2008). E-government implementation: A macro analysis of Singapore's e-government initiatives. Government Information Quarterly, 25(2), 239–255.

Chen, C.W., Pan, S.L., & Huang, W. (2009). Managing e-government implementation in China: A process perspective. Information & Management, 46(4), 203–212.

Cohen, J., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences. Hillsdale, NJ: Lawrence Erlbaum.

Cukierman, A., Edwards, S., & Tabellini, G. (1992). Seigniorage and political instability. American Economic Review, 82(3), 537–555.

Das, A., Singh, H., & Joseph, D. (2011). A longitudinal study of e-government maturity. In P.B. Seddon & S. Gregor (Eds.), Proceedings of the 15th Pacific Asia Conference on Information Systems (PACIS' 11). Brisbane, Australia: Queensland University of Technology.

Dutta, S., & Mia, I. (2010). The global information technology report 2010–2011. Geneva, Switzerland: World Economic Forum.

Egger, P., & Winner, H. (2005). Evidence on corruption as an incentive for foreign direct investment. European Journal of Political Economy, 21(4), 932–952.

Fox J. (1991). Regression diagnostics. Newbury Park, CA: Sage.

Goetz, A.M., & Jenkins, R. (2001). Hybrid forms of accountability: Citizen engagement in institutions of public-sector oversight. Public Management Review, 3(3), 363–384.

Goetz, A.M., & Jenkins, R. (2002). Voice, accountability and human development: The emergence of a new agenda (Background paper for UNDP). New York: United Nations Development Programme.

Grant, R.M. (1996). Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. Organization Science, 7(4), 375–387.

Guermazi, B., & Satola, D. (2005). Creating the "right" enabling environment for ICT. E-development: From excitement to effectiveness (pp. 23–46). Washington, DC: The World Bank Group.

Gujarati, D.N. (2003). Basic econometrics. Singapore: McGraw-Hill.

Gujarati, D.N., & Porter, D.C. (2009). Basic econometrics. New York: McGraw-Hill.

Hair, J.F., Anderson Jr, R.E., Tatham, R.L., & Black, W.C. (2006). Multivariate data analysis with readings. Englewood Cliffs, NJ: Prentice Hall.

Heeks, R. (1999). Reinventing government in the information age. In R. Heeks (Ed), Reinventing government in the information age: International practice in IT-enabled public sector reform (pp. 9–21). London: Rutledge.

Heeks, R. (2008). Success and failure in e-government projects. Retrieved from http://www.egov4dev.org/success/sfrates.shtml

Heeks, R., & Bailur, S. (2007). Analyzing e-government research: Perspectives, philosophies, theories, methods, and practice. Government Information Quarterly, 24(2), 243–265.

Ho, A.T.K. (2002). Reinventing local government and the e-government initiative. Public Administration Review, 62(4), 434–444.

Huntington, S.P. (1968). Political order in changing societies. New Haven, CT: Yale University Press.

Husted, B. (1999). Wealth, culture, and corruption. Journal of International Business Studies, 30(2), 339–360.

International Bank for Reconstruction and Development. (2002). Building institutions for markets, world development report. New York: Oxford University Press.

Jain, A.K. (2001). Corruption: A review. Journal of Economic Surveys, 5(1), 71–121.

Järvenpää, S. (1991). Panning for gold in information systems research: 'Second-hand' data. In H.E. Nissen, H. Klein, & R. Hirschheim (Eds.), The information systems research arena of the 1990s: Challenges, perceptions and alternative approaches; Proceedings of the IFIP TC8/WG8.2 Working Conference (pp. 63–80). Amsterdam: North-Holland.

Järvenpää, S.L., & Leidner, D.E. (1998). An information company in Mexico: Extending the resource-based view of the firm to a developing country context. Information Systems Research, 9(4), 342–361.

Jessop, B. (1998). The rise of governance and the risk of failure: The case of economic development. International Social Science Journal, 155(3), 29–45.

Kankanhalli, A., Tan, B.C.Y., & Wei, K.K. (2005). Contributing knowledge to electronic knowledge repositories: An empirical investigation. MIS Quarterly, 29(1), 113–143.

Kasigwa, J., Williams, D., & Baryamureeba, V. (2006). The role of ICTs and their sustainability in developing countries. In V. Baryamureba & W. Ddembe (Eds.), Measuring computing research excellence and vitality (pp. 78–88). Kampala, Uganda: Fountain Publishers.

Kaufmann, D., Kray, A., & Zoido-Lobotan, P. (1999a). Governance matters (Policy Research Working Paper 2196). Washington, DC: World Bank Development Research Group.

Kaufmann, D., Kray, A., & Zoido-Lobotan, P. (1999b). Aggregating governance indicators (Policy Research Working Paper 2195). Washington, DC: World Bank Development Research Group.

Kazancigil, A. (1998). Governance and science: Market-like modes of managing society and producing knowledge. International Social Science Journal, 155(3), 69–79.

Kiecolt, K.J., & Nathan, L.E. (1985). Secondary analysis of survey data. Beverly Hills, CA: Sage.

Kim, S., Kim, H.J., & Lee, H. (2009). An institutional analysis of an e-government system for anti-corruption: The case of OPEN. Government Information Quarterly, 26(1), 42–50.

Klitgaard, R. (1988). Controlling corruption. Berkeley, CA: University of California Press.

Koh, C.E., Ryan, S., & Prybutok, V.R. (2005). Creating value through managing knowledge in an e-government to constituency (G2C) environment. Journal of Computer Information Systems, 45(4), 32–41.

Larmour, P. (1995). Modes of governance and development. Development Bulletin, 33, 4–5.

Leff, N.H. (1964). Economic development through bureaucratic corruption. American Behavioral Scientist, 8(3), 8–14.

Lio, M.-C., Liu, M.-C., & Ou, Y.-P. (2011). Can the internet reduce corruption? A cross-country study based on dynamic panel data models. Government Information Quarterly, 28(1), 47–53.

Lucas, R.E. (1988). On the mechanics of economic development. Journal of Monetary Economics, 22(1), 3–42.

Lui, F. (1985). An equilibrium queuing model of bribery. The Journal of Political Economy, 93(4), 760–781.

Madon, S., Sahay, S., & Sudan, R. (2007). E-government policy and health information systems implementation in Andhra Pradesh, India: Need for articulation of linkages between the macro and the micro. Information Systems, 23(5), 327–344.

Malik, K., & Waglé, S. (2002). Civic engagement and development: Introducing the issues. In S. Fukuda-Parr, C. Lopes, & K. Malik (Eds), Capacity for development: new solutions to old problems (pp. 85–99). London: Earthscan.

McNeal, S., Tolbert, C.J., Moddberger, K., & Dotterweich, L.J. (2003). Innovating in digital government in the American States. Social Science Quarterly, 84(1), 52–70.

Meso, P., Datta, P., & Mbarika, V. (2006). Moderating information and communication technologies' influences on socioeconomic development

with good governance: A study of the developing countries. Journal of the American Society for Information Science and Technology, 57(2), 186–197.

Meso, P., Musa, P., Straub, D., & Mbarika, V. (2009) Information infrastructure, governance, and socio-economic development in developing countries. European Journal of Information Systems, 18(1), 52–65.

Mironov, M. (2005). Bad corruption, good corruption and growth. Retrieved from http://www.mironov.fm/research/corruption.pdf

Moon, M.J. (2002). The evolution of e-government among municipalities: Rhetoric or reality? Public Administration Review, 62(4), 424–433.

Morgan, A., & Cong, C. (2003). Integrity, internal control and security in information systems: Connecting governance and technology. Journal of the American Society for Information Science, & Technology, 54(10), 976–977.

Neto, I., Kenny, C., Janakiram, S., & Watt, C. (2005). Look before you leap: The bumpy road to e-development. In R. Schware (Ed.), E-development: From excitement to effectiveness (pp. 1–22). Washington, DC: World Bank Group.

Norris, D.F., & Moon, M.J. (2005). Advancing e-government at the grassroots: Tortoise or hare? Public Administration Review, 65(1), 64–75.

Ojha, A., Palvia, S., & Gupta, M. P. (2008). A model for impact of e-government on corruption: Exploring theoretical foundations. In J. Bhattacharya (Ed.), Critical thinking in e-governance (pp. 160–170). New Delhi, India: Gift Publishing.

Oruame, S. (2008). Corruption is killing ICT in Nigeria. Computerworld Africa, Retrieved from http://computerworldzambia.com/articles/2008/11/20/corruption-killing-ict-nigeria

Peters, B.G., & Pierre, J. (1998). Governance without government? Rethinking public administration. Journal of Public Administration Research and Theory, 8(2), 223–243.

Porter, M.E. (2005). Building the microeconomic foundations of prosperity: Findings from the business competitiveness index. In A. López-Claros, M.E. Porter, & K. Schwab (Eds.), The global competitiveness report 2005–2006: Policies underpinning rising prosperity (pp. 29–56). Geneva, Switzerland: Palgrave Macmillan.

Quibria, M.G., Ahmed, S.N., Tschang, T., & Reyes-Macasaquit, M.L. (2003). Digital divide: Determinants and policies with special reference to Asia. Journal of Asian Economics, 13(6), 811–825.

Radaelli, C.M. (2007). Whither better regulation for the Lisbon agenda? Journal of European Public Policy, 14(2), 190–207.

Ravichandran, T., & Lertwongsatien, C. (2005). Effect of information systems resources and capabilities on firm performance: A resource-based perspective. Journal of Management Information Systems, 21(4), 237–276.

Robertson, C.J., & Watson, A. (2004). Corruption and change: The impact of foreign direct investment. Strategic Management Journal, 25(4), 385–396.

Rodriguez, P., Uhlenbruck, K., & Eden, L. 2005. Government corruption and the entry strategies of multinationals. Academy of Management Review, 30(2), 383–396.

Romer, P.M. (1990). Endogenous technological change. Journal of Political Economy, 98(5), S71–102.

Sadowsky, G. (1993). Network connectivity for the developing countries. Communications of the ACM, 36(8), 42–47.

Sadowsky, G. (1996, November/December). The internet society and developing countries. On the Internet: An International Publication of the Internet Society, 23–29.

Satola, D., Sreenivasan, R., & Pavlasova., L. (2004). Benchmarking regional e-commerce in Asia and the Pacific and assessment of related regional initiatives. In Harmonization of legal and regulatory systems for e-commerce in Asia and the Pacific: Current challenges and capacity building needs (pp. 3–22). New York: United Nations Publications.

Schware, R. (2005). E-development: From excitement to effectiveness (Prepared for the World Summit on the Information Society). Washington, DC: World Bank Group.

Selwyn, N., & Brown, P. (2000). Education, nation states and the globalization of information networks. Journal of Educational Policy, 15(6), 661–682.

Senior, I. (2004). Corruption, the government and the private sector: Why it matters and what can be done. Economic Affairs, 24(2), 22–29.

Siau, K., & Long, Y. (2006). Using social development lenses to understand e-government development. Journal of Global Information Management, 14(1), 47–62.

Siau, K., & Long, Y. (2009). Factors impacting e-government development. Journal of Computer Information Systems, 50(1), 98–107.

Singh, H., Das, A., & Joseph, D. (2007). Country-level determinants of e-government maturity. Communications of the Association for Information Systems, 20(1), 632–648.

Soh, C., & Markus, L. (1995, December). How IT creates business value: A process theory synthesis. Paper presented at the Sixteenth International Conference on Information Systems, Amsterdam, The Netherlands.

Srivastava, S.C. (2011). Is e-government providing the promised returns? A value framework for assessing e-government impact. Transforming Government: People, Process and Policy, 5(2), 107–113.

Srivastava, S.C., & Teo, T.S.H. (2007). E-government payoffs: Evidence from cross-country data. Journal of Global Information Management, 15(4), 20–40.

Srivastava, S.C., & Teo, T.S.H. (2008). The relationship between e-government and national competitiveness: The moderating influence of environmental factors. Communications of the Association for Information Systems, 23(2), 73–94.

Srivastava, S.C., & Teo, T.S.H. (2010). E-government, e-business, and national economic performance. Communications of the Association for Information Systems, 26(1), 267–286.

Sudan, R. (2005). The basic building blocks of e-government. In R. Schware (Ed.), E-development: From excitement to effectiveness (pp. 79–100). Washington, DC: World Bank Group.

Tan, C.W., & Pan, S.L. (2003). Managing e-transformation in the public sector: An e-government study of the Inland Revenue Authority of Singapore (IRAS). European Journal of Information Systems, 12(4), 269–281.

Tapscott, D. (1996). The digital economy: The promise and peril in the age of networked intelligence. New York: McGraw-Hill.

Teece, D.J. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. Research Policy, 15(6), 285–305.

Teo, T.S.H., & Koh, T.K. (2010). Lessons from multi-agency information management projects: Case of the Online Business Licensing Service (OBLS) Project, Singapore. International Journal of Information Management, 30(1), 85–93.

United Nations. (2008). UN global e-government survey 2008: From e-government to connected governance. Retrieved from http://www.unpan.org/egovkb/global_reports/08report.htm

United Nations. (2010). UN global e-government survey 2010: Leveraging e-government at a time of financial and economic crisis. Retrieved from http://www.unpan.org/egovkb/global_reports/08report.htm

United Nations Development Programme. (1997). Governance for sustainable human development (A UNDP policy document). Retrieved from http://mirror.undp.org/magnet/policy/

United Nations Development Programme. (2008). Tackling corruption, transforming lives: Accelerating human development in Asia and the Pacific. New Delhi, India: Macmillan Publishers.

United Nations Office on Drugs and Crime (2004). The global programme against corruption – UN anti-corruption toolkit. Vienna: UNODC.

Von Haldenwang, C. (2004). Electronic government (e-government) and development. The European Journal of Development Research, 16(2), 417–432.

Wade, M., & Hulland, J. (2004). The resource-based view and information systems research: Review, extension, and suggestions for future research. MIS Quarterly, 28(1), 107–142.

Warkentin, M., Gefen, D., Pavlou, P.A., & Rose, G.M. (2002). Encouraging citizen adoption of e-government by building trust. Electronic Markets, 12(3), 157–162.

Weill, P. (1991). The role and value of information technology infrastructure: Some empirical observations. In R.D. Banker, R.J. Kauffman, & M.A. Mahmood (Eds.), Strategic information technology management:

Perspectives on organizational growth and competitive advantage (pp. 547–572). Harrisburg, PA: Idea Group Publishing.

West, D.M. (2004). E-government and the transformation of service delivery and citizen attitudes. Public Administration Review, 64(1), 15–27.

World Bank. (1994). Governance: The World Bank's experience. Washington, DC: World Bank.

Woszczynski, A., & Whitman, M. (2004). The problem of common method variance in IS research. In A. Woszczynski & M. Whitman (Eds.), The handbook of information systems research (pp. 66–77). Hershey, PA: Idea Group Publishing.

Yoon, J., & Chae, M. (2009). Varying criticality of key success factors of national e-strategy along the status of economic development of nations. Government Information Quarterly, 26(1), 25–34.

Appendix

Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo (Democratic Republic), Congo (Republic), Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial, Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, South Korea, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libyan Arab Jamahiriya, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Rwanda, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, South Africa, Spain, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vanuatu, Venezuela, Viet Nam, Yemen, Zambia, Zimbabwe.

Total number of countries included for data analysis = 178.