A Policy Diffusion Model of E-Government Implementation Across Nations

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Paper prepared for the 23rd World Congress of Political Science, Montreal, Canada, July 19-24, 2014
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Abstract

Effective e-government creates an environment for citizens to have greater access to their government and, in theory, makes citizen-to-government contact more inclusive. Our research examines two distinct but related measures of e-government effectiveness, namely the online service index and the e-participation index, both reported in the 2010 e-government survey conducted by the United Nations. We analyze the impact of political structure, public sector performance and policy initiatives on both indices in more than 150 countries. Our multiple regression analysis shows that there is greater e-government capability in countries that have more effective public sector governance and administration, and policies that advance the development and diffusion of information and communication technologies. More democratic institutions and processes, however, appear to have a negative impact on e-government. In addition, countries that practice effective governance and promote competition in the telecommunications sector demonstrate more extensive provision of e-participation. These results suggest that the path to e-government leverages different strategies depending on a nation’s political structure, and that authoritarian countries may be utilizing e-government to maintain the status quo.
Highlights

Countries that have more effective public sector governance and administration offer a higher level of online government services and opportunities for e-participation.

Countries that have an independent national regulatory authority for telecommunications have more of an online services presence.

Countries that devote more financial resources to develop and promote ICTs provide more online services.

Countries that have more open competition in their telecommunication industries provide more online services and opportunities for e-participation.

Online government information and services are more extensive in less democratic countries than in more democratic countries.

Keywords: E-Government, E-Participation, Governance, Regulation, Telecommunications Policy, Democratic Institutions
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1. Introduction

The number of countries that are expanding initiatives to further public sector efficiencies and transparency with new information and communication technologies (ICT) applications is increasing (United Nations, 2012). The most significant improvement in recent years is that more countries are offering tax forms, legal and legislative documents, transactional capabilities, e-updates, and other features and services online. Only three countries had failed to establish and online presence in 2012 (United Nations, 2012, pp. 39). Moreover, the government portals and web sites include more advanced technical features, and a large percentage of national governments regularly update their e-government offerings. While we see the delivery of online services becoming an established practice, only a few countries are successfully implementing e-participation. Indeed, more than one-third of countries offered no e-participation services at all in 2012 (United Nations, 2012, pp. 45). Of the UN member states that do, only a limited number offer services that enable citizens to be active participants in government decision-making and the policy-making process.

A vast body of scholarly research has documented the significant global digital divide between high income and low income countries in diffusion of ICTs (Chen & Wellman, 2004; Norris, 2001; Rice, 2003). A similar divide has emerged in the implementation of both government e-service delivery and e-participation. Yet a number of countries in the developing world have managed not only to overcome these trends and establish a significant e-government presence, but also to offer innovative tools to enhance government performance that many developed countries still lack. It is therefore important to understand what explains the variation in the availability and quality of e-government across the globe. This study seeks to answer that question by analyzing the impact of potential explanatory factors on recent United Nations’ global measurement of (1) online government services and (2) electronic participation capabilities (United Nations, 2012). The next section develops our hypotheses on the impact
that political structure, public sector performance, and specific public policy initiatives have on a nation’s e-government capability in the form of government services offered and of opportunities for citizens to participate in government decision making online. We then present our measures and analyses that estimate the effects of structure, performance and policy variables on two measures of e-government at the national level in approximately 165 countries. Section 4 describes the factors that affect the UN online service index (OSI) and e-participation index (EPI), which reveal both similarities and differences in the two sets of findings. The final section discusses our conclusions and their implications for e-government and e-participation.

2. Explaining Variation in E-Government Success

Government agencies and political bodies use information and communication technologies to improve the availability of information and delivery of services to citizens and to facilitate their communication with business and industry. These in turn improve efficiency and transparency in government (World Bank, 2009). ICTs also offer citizens the potential for greater access to government officials and offer policy makers the ability to make citizen-to-government contact more inclusive. For the less fortunate and more isolated members of society, advances in ICTs can help overcome the geographical, institutional and social barriers to information and give marginalized groups a voice in the political sphere.

While a few scholars find the potential of e-government to have been elusive (Heeks, 2002; Hindman, 2008; Sunstein, 2007), the greater concern is that a technological divide is emerging both between nations and within nations, creating groups of “information-rich” and “information-poor” societies. Even more disconcerting is that this divide seems to overlap considerably with the economic divide that already separates developed and developing countries and, thus, is reinforcing or even widening existing economic, political and social inequalities between the haves and have-nots (Forestier et al., 2002; van Dijk, 2005).
E-government surveys from recent years provide data that show that the concerns of the pessimists have not been unwarranted (United Nations, 2010, 2012; West 2008). Among the 20 global leaders in the implementation of e-government in 2012 (United Nations), 16 are from either North America, Europe or Oceana and three are from high income countries in East Asia. A similar distribution is found among the next 25 countries, which the United Nations has designated as “emerging leaders.” Most low income nations rank within the bottom tier. Most African nations, moreover, have showed little improvement over the past few years. This digital divide also appears along the lines of income and region for offerings of online government services (Chatfield & Alhujran, 2009; Gascó, 2005) as well as in the opportunities for citizen e-participation (United Nations, 2010, 2012).

It is not surprising that there is a statistical relationship between greater e-government development and national income. Countries with more wealth and a more affluent and technologically-developed society are in a stronger position to respond to citizens’ demands for more spending on ICTs. For nations in the developing world, however, weak citizen demand for e-government and limited financial resources gives these nations less incentive to develop their e-government offerings. Surprisingly, the earliest cross-national studies did not find a significant relationship between resources and a nation’s commitment to, and success in, implementing e-government applications (Norris, 2001; West, 2005). More recent studies have found that countries with more wealth and an affluent population spend more on e-government development (e.g., Moon et al., 2005; Rose, 2005).

Societies that allow for peaceful transitions of power, widespread electoral participation, and checks on power also are more likely to demand that government use new means for providing transparency and citizen participation. Democratic governments also should be inclined to be more inclusive in an attempt to widen their electoral appeal. Moreover, societies that have a culture of encouraging political expression and facilitating communication between government and citizens are more likely to demand that their governments use technology to provide more transparency and avenues for participation (Dahl, 1989; Lijphart, 1999). Studies that examined global e-government data prior to 2004 found that neither democracy (Moon et al., 2005) nor civil liberties (West, 2005) help explain e-
government performance. More recent studies suggest that e-government has developed more rapidly in countries with stronger democratic institutions (Azad et al., 2010; Gulati & Yates, 2011; Kim, 2007; Rose, 2005). Each of these studies used a different indicator for measuring political structure, however, indicating that a more careful measurement strategy is needed before making any firm conclusions about the relationship between e-government and democratic institutions.

The absence of a consistent and clear relationship between democratic political structure and e-government development is illustrated by the cluster of countries that the UN has highlighted for their efforts in developing e-government resources. Countries exhibiting various levels of democratic freedoms are cited for their highly integrated national governmental portals that allow citizens quick and easy access to government information and services. Tunisia and Russia were cited for developing and implementing standards for ministries and agencies and greater linkages and integration among departments. On its national portal, Brazil, for example, provides an A to Z search feature that allows citizens to locate the appropriate department to apply for government benefits and make payments on taxes, fines and utilities. South Korea provides similar opportunities but through multiple channels. The UN also heaped praise on democracies such as India, Israel and Denmark for their e-government efforts, but also had praise for Saudi Arabia, China, and Pakistan (United Nations, 2012, ch. 2).

There is similar inconsistency in the relationship between democracy and more democratic participatory e-government features (i.e., e-participation), as the cluster of countries offering e-participation opportunities illustrates. For example, Kazakhstan publicizes data on the number of questions and comments received by agency executives and the frequency of responses made by the executives. In Columbia, citizens can post comments and express their views through government social media pages and employ online forums, blogs, and opinion polls to engage with government officials. Citizens in Australia can send comments and suggestions on draft regulations to specific ministries and also view results of the outcomes of previous public e-consultations (United Nations, 2012, sec. 2.2.2).

If innovative e-government initiatives have been implemented successfully in a number of non-democratic countries, then factors other than resources and democratic institutions contribute to the
availably of government services and participatory opportunities online. Since e-government largely is an extension of existing government institutions and administered by public sector personnel (Brown, 2005; Layne & Lee, 2001), it is likely that a more professional and effective public sector will offer more information and services online than a public sector that is poorly developed and inefficient (Moon & Norris, 2005; Tolbert et al., 2008). Fountain (2001) argues for example, that public sector organizations that are structured as Weberian bureaucracies are best able to develop technological innovations, which includes e-government applications. But while these innovations are meant to enhance efficiency and functionality by facilitating improved collaboration, information sharing and communication among organizational members, new technologies can be employed coercively to reinforce existing norms and relationships.

The evidence from US municipalities supports Fountain’s theoretical framework by showing that technological innovations are more likely to emerge in governments in which the managerial culture is more professional in terms of administrative personnel and procedures (Moon, 2002; Moon & Norris, 2005). At a cross-national level, Kim (2007), and Gulati & Yates (2011) found that government effectiveness was important in determining e-government performance. Other studies have found that poor governance, measured as the extent of corruption, reduced the quality of web-based government applications and services (Rose, 2005; Azad et al., 2010). Lee et al. (2011) not only found similar results for corruption, but also found that greater government corruption reduced the extent of e-participation development. The strong theoretical link between effective governance and e-government development coupled with the empirical evidence from these cross-national studies are the basis for our first hypothesis:

(H1): Countries that have more professional public administration practices will have more extensive development of e-government than countries that have less professional administrative practices.

King et al. (1991) emphasize the importance of supply-side and demand-side policies and regulations in developing and deploying ICTs. Both of these sets of policy initiatives also help bridge the
global digital divide (Chen & Wellman, 2004; Mossberger, Tolbert & Stansbury, 2003), which in turn should increase demand for e-government capabilities. On the supply-side, direct financial investment in the telecommunications sector in the form of financing relevant infrastructure projects or indirectly in the form of tax incentives to the private-sector firms that invest in research and development can be essential to bridging the various digital divides (Frieden, 2010; ITU, 2007). The difficulty of parsing out how much of a nation’s investment and spending is a result of public sector contributions has made it difficult to test empirically its impact on the development of e-government. Attempts to estimate the impact of investment indirectly with relatively crude indicators have found a positive relationship between Internet penetration and the amount of spending on research and development in the country overall (Norris, 2001) and a positive relationship between e-government development and the number of scientists residing in a country (West, 2005). Using a measure of financial investment that includes both public sector and private sector spending and investment, Gulati & Yates (2011) found a strong relationship between e-government development and financial investment. No other recent cross-national studies to date have replicated these findings.

Privatization, competition and deregulation of the telecommunications industry are seen as critical. Studies show that effective demand-side policies can promote healthy competition within and among ICT industries by increasing innovation in ICTs and their availability while lowering the cost of production and prices to consumers. Nations with greater ICT development are those that have more competition to provide basic telecommunication services (Guillén & Suárez, 2005; van Dijk, 2005). One cross-national study has found that there is a relationship between competition in the telecommunications industry and e-government development (Gulati & Yates, 2011).

The theoretical link between specific policy initiatives and development of ICTs generally, together with growing empirical evidence connecting e-government with financial investment in ICTs and competition in the ICT sector underlie our next two hypotheses:

(H2): Countries that have invested more in ICTs will have more extensive development of e-government than countries that have invested less in ICTs.
(H₃): Countries that have a more competitive telecommunication sector will have more extensive development of e-government than countries that have a less competitive or state-owned telecommunications sector.

None of these studies assessing the impact of competition in the ICT sector and/or financial investment in ICTs have controlled for the relative impact of public sector performance, however, which is essential for the effective implementation of these policies.

3. Data and Methods

3.1. Dependent variables

We test our three hypotheses by estimating two OLS multiple regression models. Our first indicator of effective e-government and the dependent variable in our first model is the United Nations’ online service index (OSI), a subset of the UN’s broader e-government development index. Constructed for 192 countries, the OSI measures the extent of a nation’s performance in online service maturity. More specifically, the index captures the extent of (1) emerging information services; (2) enhanced information services; (3) transactional services; and (4) connected services, with greater weight given to the higher stage, more sophisticated tools and applications. Values on this index range from 0 to 1, with South Korea (1.0), USA (0.94), and Canada (0.88) exhibiting the highest scores, and the Central African Republic, Somalia and Zambia exhibiting the lowest (0.0) (United Nations, 2010). We did not use the UN’s broader e-government development index because many of its individual indicators measure telecommunications infrastructure and educational levels, which are theoretically linked to causal explanations of e-government capability and are included in our two models as independent variables.

Our second dependent variable is the United Nations’ e-participation index (EPI). Constructed for 170 countries, the EPI measures the extent of a nation’s performance in promoting citizen engagement and facilitating communication among government, citizens, businesses and society. More specifically, the index captures the extent to which governments use the Internet for disseminating information about its proposals and activities, consulting with citizens on matters of public policy, and allowing for direct
citizen participation in decision-making. Values on this index can range from 0 to 1, with South Korea (1.0), Australia (0.91), and Spain (0.83) exhibiting the highest scores, and 23 countries exhibiting the lowest (0.0143). While there is criticism of the EPI because its components only superficially seem to capture citizen involvement in government decision-making (Grönlund, 2011; Macintosh, 2004; Medaglia, 2012), the individual items that comprise the EPI not only are distinct from the OSI, but also go beyond information dissemination and service provision. In a sense, the EPI represents the minimum that would be needed on government web sites for any citizen participation to be possible.

While there is a high correlation between a country’s score on the OSI and EPI ($r=.86$), there are a number of countries that are ranked much lower on the e-participation index than on the online service index and a few countries that are ranked much higher on e-participation than online services. For example, the Czech Republic, El Salvador, and Switzerland are ranked in the highest quartile on the OSI, but are ranked in the second lowest quartile on e-participation. Seven other countries ranked in the highest quartile are ranked in the second highest quartile on e-participation. On the other hand, Congo is ranked in the lowest quartile on the OSI, but in the second highest quartile on e-participation. There also are eight countries ranked in the highest quartile on the EPI, but in the lowest three quartiles on the online service index. This indicates that participatory features and services may not necessarily require a sophisticated e-government infrastructure in order for a country to use the Internet to engage citizens and include citizens more in government decision-making and governing.

The large number of countries that have very few or none of their government services online or do not use the web for enabling citizen participation yields a long tail of small values in the distribution of both the OSI and the EPI. We therefore take the natural logarithm of both indices to be the dependent variable in our OLS regression analysis.

3.2 Governance

We measure the impact of governance with two independent variables. First, we used the six indicators from the Worldwide Governance Indicators (WGI) project (Kaufmann, Kraay & Mastruzzi, 2009) to
assess the administrative professionalism and governmental performance in each country: (1) Government effectiveness; (2) Regulatory quality; (3) Rule of law; (4) Political stability and absence of violence; (5) Control of corruption; and, (6) Voice and accountability. Initially, we considered including these indicators separately in the model, but observed that many of the inter-variable correlations were above 0.70. We instead created a government performance index by computing the average among the standardized scores for each of the six indicators. Denmark (2.10), Finland (2.02) and Sweden (2.01) scored highest on this measure, while Somalia (-2.31), North Korea (-2.21) and Turkmenistan (-1.78) scored the lowest.

A more specific indicator of governance in the ICT policy sphere is the presence or absence of an independent national regulatory authority for telecommunications. A review of a number of case studies indicates that nations that have been most successful at utilizing information and communication technologies for on-line government are those that have established an independent executive-level department or national-level agency responsible for promoting and managing the expansion of telecommunication products and services (Garrard, 1997; Hanna, 2010; ITU, 2012). Thus, countries with some sort of independent regulatory authority should provide better e-government for their citizens. To perform our analysis, we encoded the presence of a national independent regulatory authority for each country, as published in (ITU, 2011), as follows:

“0” if there is no independent regulatory authority; and

“1” if there is an independent regulatory authority.

In 2010, over 63% of countries for which the ITU publishes these data had an independent national telecommunications regulatory authority.

Most of the cross-national studies reviewed above did not distinguish between e-government services and more the democratic features of e-government (Gulati & Yates, 2011; Kim, 2007; Moon, 2002; Moon & Norris, 2005). While Lee et al., 2011 did make the distinction, they found that both services and participation were positively related with better governance. Thus, we do not expect that the effects of governance should be different in the OSI and EPI models.
3.3 Financial investment

We used Gulati and Yates’ (2011) *Financial Investment Index* to measure a nation’s financial investment in ICTs. This index was derived from seven indicators obtained from the World Bank’s World Development Indicators (WDI) database of nearly 240 variables that pertain to economic activity related to technological development or to either public or private investment in ICTs. The seven indicators included in the index are telecommunications revenue (as a percentage of GDP); ICT expenditures (as a percentage of GDP); telecommunications investment (as a percentage of revenue); research & development spending (as a percentage of GDP); natural log of international Internet bandwidth (bits per second per person); high-technology exports (as a percentage of manufacturing exports); and computer, communications and other services (as a percentage of service exports). With most of these indicators representing a proportion of total spending rather than an absolute amount per capita, this index also indirectly gauges the priority that a nation places on developing ICTs and support for the technology sector. The values on this index ranged from –1.808 (Liberia) to 1.178 (Philippines). Many of the other countries in the top 20 for financial investment include high-income countries such as Japan, South Korea, Singapore, Sweden, Finland, the Netherlands, United States and United Kingdom. But there are some surprises as well, with less developed countries such as Ireland, Israel, Malaysia, the Dominican Republic, and Guyana ranking among the top 20 countries in prioritizing financial investment in ICTs.

3.4 Competition

To measure the extent of competition in the telecommunications sector, we used Gulati & Yates’ (2011) *Telecommunications Competition Index*. This index is derived from six indicators obtained from the International Telecommunication Union’s ICT Eye database that take into account the level of competition in various telecommunications industries: basic telephone service; mobile services; narrowband Internet service; DSL-based Internet service; cable-based Internet service; and cross-platform competition. Values on this index range from –1.951 to 1.184, with 50 countries sharing the highest score and six countries sharing the lowest score.
3.5 Control variables

To account for the impact of political structure and a culture of democratic politics, we included the Unified Democracy Scores (UDS) for 2008. The UDS is derived through a Bayesian latent variable approach and draws from 10 frequently used indicators of democracy (e.g., Polity IV and Freedom House) to produce a single composite scale (Pemstein, Meserve & Melton, 2010). Values of the UDS ranged from -1.478 to 2.02 in 2008. Saudi Arabia, North Korea, Myanmar, and Qatar had the four lowest scores, while Switzerland, Denmark, the Netherlands, and Norway had the four highest scores.

We include four non-political variables in our regression models that have a theoretical link to e-government or an empirical link shown in previous research. Previous cross-national studies of e-government have assumed that countries with more wealth and an affluent population will be in a stronger position to spend more on e-government development, e.g., (Moon, Welch & Wong, 2005; Rose, 2005). In addition, people who have a higher level of education are more likely to demand that more services be made available over the Internet (Kim, 2007). The empirical evidence linking resources and education to e-government has not shown a consistent pattern, however. We use the United Nations’ GDP Index and Education Index for 2007/2008 (United Nations, 2007) to capture and distinguish the impacts between a nation’s economic resources and education on the dependent variables in our two models.

Government and private industry are more likely to be successful in delivering e-government applications and services in urban areas, where the population is more concentrated and infrastructure for Internet connections and mobile devices is already in place. On the other hand, the need for e-government services and applications is greater in areas that are larger in size, where personal contact between citizens and members of the national government can be difficult or inconvenient. We therefore measure urbanization as the percentage of residents living in urban areas. We account for distance by using the country’s total size in square kilometers. Data for urbanization and land area were obtained from the CIA web site (CIA, 2011).
4. Data Analysis

4.1. Online Services Index

The regression analysis of the log-transformed value for the online service index in 167 countries on the nine independent variables revealed that higher government performance, an independent telecommunications regulatory authority, greater competition in the telecom sector, higher financial investment in telecoms all increased the extent to which countries have government information and services online. The relationships between the online service index and education, urbanization and land area also were positive. The relationship was negative, however, between the online service index and the level of democratization. There was no relationship between the online service index and economic wealth. In this analysis, the five political and four control variables together explained 52% of the variance in the dependent variable.

Because the GDP Index control variable was not statistically significant but was highly correlated with government performance (r=.76), the Education Index (r=.78) and urbanization (r=.74), we re-estimated the model without the GDP variable (with N increasing to 171) and report these results in Table 1. The coefficients for the government performance index in the first row are statistically significant at the .01 level and support the hypothesis that effective public sector governance and administration increases the level of information and services a nation provides online (H1). When holding all other variables constant, a 0.10-unit increase in a country’s WGI score increases a country’s score on the online service index by 2.4%. A country that has the mean value (-0.07) on the WGI index would have a score that was 5.6% higher on the OSI than a country that has the minimum WGI score (-2.4). And a country that has the maximum value (1.82) would have a score on the OSI that was 4.4% higher than a country with the mean value.

[Table 1 about here]

The coefficients in the next row indicate that countries that have an independent national regulatory authority for telecommunications have more of an online presence than countries that do not have a nationwide agency. When holding all other variables constant, countries with an independent national
regulatory authority have a score on the OSI that is 20% higher on the 0 to 1 scale than countries without a national regulatory authority or countries that have one that is not independent. The coefficients are statistically significant at the 0.01 level and further support our hypothesis that those countries with effective governance, particularly in the area of strategic support for the advancement of information and communication technologies, are more likely to provide their citizens with services online (H₁).

The presence of a national-level bureaucratic organization dedicated to regulating communications suggests a national commitment to guiding the development and diffusion of technological innovations in society. The public sector is a beneficiary of these innovations and, therefore, is in a position to assist legislative and governing institutions to develop innovative ways to communicate with citizens, organizations and each other (Fountain, 2001; Moon & Norris, 2005; Tolbert, et al., 2008). But for public sector organizations to leverage technology to deliver services online, there already must exist a professional administrative culture and practice of effective governance (Brown, 2005; Layne & Lee, 2001). The results presented in the first two rows of Table 1 indicate that countries that are having the most success in delivering online services are those that have had the most success administering public services in general.

The coefficients for the financial investment index are statistically significant at the .05 level and indicate that countries that devote more financial resources to develop and promote information technology, telecommunications and related industries also are more likely to develop a greater online presence, supporting hypothesis (H₂). When controlling for the effects of all other variables, a 0.10-unit increase in the indicator for ICT investment leads to an increase of 2.7% on the OSI. In other words, a country that invests the maximum value on our index of financial investment would score approximately 6% higher on the OSI than a country that had invested the mean value. Whether it be from the public or private sector, greater direct financial investment in the form of research and development spending for ICTs and relevant infrastructure enhance e-government because there is a greater availability and affordability of the infrastructure and products needed to deliver a wide array of services online.
The fourth row of data reports the coefficients for the telecommunications competition index. These coefficients indicate that countries that have more open competition in their telecommunication industries also have a greater online presence than countries that have a more heavily regulated sector. A 0.10-unit increase in the telecommunications competition index increases a country’s score on the OSI by 1.7% when controlling for all other variables. The coefficients are statistically significant at the 0.05 level and thus provide support for our hypothesis that countries that implement policies to promote information and communication technologies have a better online presence than countries that are less supportive (H₄).

Privatization and competition in the computing and communication industries can create a highly favorable environment for government to develop online communications with (and service delivery to) its citizens. In such an environment, service providers deploy more efficient telecommunications infrastructure to connect citizens and their government; governments can usually purchase superior products and services to implement e-government; and, citizens have more choices in service providers.

The coefficients for the control variables are shown beginning in the fifth row of data in Table 1. The coefficients for the democracy scores are statistically significant at the .05 level and indicate that there is a strong negative connection between the presence of democratic political institutions and processes and the extent of e-government services. The relationship is not in the direction that we expected, however. Rather, e-government services are more extensive in less democratic countries and less extensive in the more democratic countries. When holding all other variables constant, a one-unit increase in a country’s UDS score decreases a country’s score on the online service index by 1.9%. To further illustrate, a country that has the mean value (0.424) on the UDS would have a score that was 3.7% lower on the OSI than a country that has the minimum score (-1.48). And a country that has the maximum value (2.02) would have an OSI score that was 3.1% lower than a country with the mean value.

More detailed case studies are needed to understand the causal relationship between democratic institutions and e-government capability. Quite possibly the centralization that characterizes authoritarian regimes makes them more efficient than democracies in implementing policy decisions and directives to provide online services. Also, it may be the case that the absence of democratic institutions implies a lack
of transparency and citizen engagement and what these governments are placing online is superficial in nature and meant to provide an appearance of openness. And in countries where there is a longstanding culture of openness, there is much more emphasis placed on maintaining existing means of government-to-citizen communication. In sum, the provision of more online services is not associated with a democratic political system, but rather seems to be associated with a more authoritarian political system.

An increased level of education had a substantial effect on a national government’s online presence. The coefficients for the Education Index are statistically significant at the .01 level. A .01-unit increase on the Education Index increases the level of online services by a substantial amount, almost 13%. The coefficients for urbanization and land mass also are statistically significant and increase the level of online services.

4.2. E-Participation index

The results of the regression analysis of the log-transformed value for the e-participation index in 158 countries on the five political variables, three control variables (i.e., without the GDP Index) are reported in Table 2. The same eight independent variables used to estimate the model of online services together explain 48% of the variance in the extent to which countries provide participatory opportunities online. Whereas all five of the political variables were statistically significant in the model of online services, only two—government performance and the telecom competition index—are significant in the model of e-participation capabilities. Democratic political structure, the presence of an independent national regulatory authority for communication technologies and the level of shared financial investment are not significant in the e-participation model.

As the coefficients in the first row show, there is a strong and statistically significant relationship between the government performance index and the e-participation index. When holding all other variables constant, a 0.10-unit increase in a country’s WGI score increases a country’s score on the EPI by 2.56%. A country that has the mean value (-0.07) on the WGI index would have a score that was about 6% higher on the participation index than a country that has the minimum WGI score (-2.4). And a
country that has the maximum value (1.82) would have a score on the participation index that was just less than 5% higher than a country with the mean value. This finding further supports the hypothesis that more professional public administration practices increase e-government (H1). In addition, the results show that an efficient and effective public sector is necessary not only for electronic delivery of services, but also for facilitating electronic avenues of participation.

[Table 2 about here]

The coefficients in the next row indicate that there is no relationship between the presence of an independent national regulatory authority for telecommunications and e-participation capabilities. Having an independent agency with responsibility of guiding the strategic development of communication technologies seems to be important for developing the infrastructure for e-government, but does not seem to be useful in promoting or developing the corresponding higher level democratic means of citizen-to-government communication.

The coefficients in the third row indicate that there is no relationship between the level of financial investment and e-participation. The coefficients for the financial investment index are not statistically significant at any conventional level of significance. As with the case of an independent agency for ICT strategy, financial investment in ICTs may be essential for building infrastructure, but has no impact on whether government leaders and administrative officials place an importance on encouraging citizen participation via e-government applications and services. E-participation does not merely require the ability to engage the public and encourage participation online, but also the commitment within the government to have a more participatory democratic decision-making process.

The fourth row of data reports the coefficients for the telecommunications competition index. These coefficients indicate that countries that have more open competition in their telecommunication and related industries also have greater e-participation opportunities than countries that have a more heavily regulated sector. A 0.10-unit increase in the telecommunications competition index increases a country’s score on the EPI by more than 2.5% when controlling for all other variables. The coefficients are statistically significant at the 0.01 level and provide support for our hypothesis that countries that develop
policies to promote the diffusion of information and communication technologies have greater opportunities for citizen participation online than countries that are less supportive (H3). In substantive terms, a country with the highest value our index of competition (1.18) would score approximately 8% higher on the e-participation index than a country that had the lowest score (-1.95), which corresponds to countries with the least competitive telecommunication markets.

The coefficients for the control variables are again shown beginning in the fifth row of data. The coefficients for the democracy scores show that there is no relationship between the presence of democratic political institutions and processes and government implementation of e-participation. The absence of a statistically significant relationship between the democracy scores and e-participation scores indicates that a more democratic political structure has no effect on the extent of a country’s participatory e-government.

An increased level of education had a substantial effect on a nation’s e-participation capabilities. The coefficients for the Education Index are statistically significant at the .05 level. A .01-unit increase on the Education Index increases the level of online services by almost 11%. The coefficients for urbanization and land mass also are statistically significant and increase the e-participation index.

5. Conclusions and Implications

Our research assesses the relationship of political factors and policy initiatives to improved e-government services and e-participation capabilities. We showed that countries that have more effective public sector governance and encourage competition in the telecommunications sector evidence more extensive provision of e-government services. Specifically, these two factors have a positive and significant relationship with both the OSI and EPI (United Nations, 2010). An independent national telecommunications regulatory authority and greater financial investment in ICT development also are positively related to the United Nations OSI.

This is the first cross-national study of e-government implementation to assess the impact of effective governance with the full range of governance indicators. Previous studies have relied on single indicators
(Gulati & Yates, 2001; Kim, 2007; Lee et al., 2011; Rose, 2005) and, thus, omitted measurement of important aspects of public sector performance. It is not surprising that we found that public sector performance has a strong positive impact on the extent of a country’s e-government implementation since there were strong theoretical reasons for expecting this to be the case (e.g., see Brown, 2005; Fountain, 2001). It was not anticipated, however, that governance would have the largest impact of any variable in our model. This indicates, moreover, that the culture and practices within the public sector are what will drive further implementation of e-government rather than external demands and needs. It is therefore unlikely that the promise of e-government whether in terms of online services or citizen participation can become a reality in laggard nations without transformations first occurring in their public sectors (Moon & Norris, 2005; Tolbert, et al., 2008). Elected policymakers are not powerless to make a difference, however. We also find that specific policies matter. While the policy initiatives we evaluated are intended to support the ICT sector as a whole and telecommunications industries more specifically, these initiatives also enhance e-government. Presumably this is because the more available and the more affordable ICT products and services are, the more able governments are to operate and maintain an effective e-government capability.

Our most surprising findings were the negative relationship between the level of democracy and online government and the absence of any relationship between democracy and e-participation. It underscores an important and often overlooked point that e-government (in particular, online service provision) and e-participation are different (Lee, et al., 2011). And, the two are not necessarily linked. Researchers therefore need to differentiate the drivers and outcomes of each, and policy makers should be cognizant of the difference in developing strategies to advance them. Our results also sound a cautionary note. Given that the path to e-government leverages different strategies depending on a nation’s political structure, it is possible those countries in which there is less democracy may be utilizing e-government to maintain the status quo. Case studies of China, Costa Rica and Cuba (Hoffmann, 2004; Kalathil & Boas, 2001; Ma, Chung & Thorson, 2005), for example, demonstrate that these authoritarian governments have pursued successful reactive strategies to control Internet content and access, making substantial
investments in ICTs to do so. At the same time, authoritarian states can and do pursue proactive strategies to extend central control by guiding the development of the medium to promote their own interests and priorities. Thus, through a combination of reactive and proactive strategies, authoritarian regimes have learned to counter the challenge posed by the potential democratizing influences of the Internet (Kalathil & Boas, 2001). Corrales and Westhoff (2006) find that high-income, market-oriented autocratic states are less draconian because although they fear the political consequences of Internet expansion, they welcome its economic payoffs. Indeed, Ma, Chung and Thorson (2005) conclude that “Chinese e-government initiatives can be best understood as vehicles intended to support economic development through an increasingly transparent and decentralized administration while at the same time providing the central government the information and ability to efficiently monitor and potentially steer economic activity at a more abstract level.”

An alternative line of reasoning is based in the “authoritarian bargain” between rulers and citizens by which citizens relinquish political rights to gain economic security. Desai, Olofsgård and Youset’s (2009) empirical evidence from 45 non-democratic states confirms the tradeoff of bundles of welfare benefits to secure public support. Jiang and Xu (2009) show that by providing limited improvement in administrative efficiency and transparency, Chinese provincial governments are able to deflate social tension and reestablish party legitimacy. Manipulating online structures through information delivery, agenda setting, and containment of public dissent is a more subtle form of online social control. Kardan and Sadeghiani’s longitudinal study of Iran finds a positive but low trend of change in e-government initiatives from 2008 to 2009, but a substantial negative trend of change in e-democracy during the same period. They recommend against an emphasis on e-government as a path to e-democracy in authoritarian countries such as Iran (Kardan & Sadeghiani, 2011).

There are of course other factors that contribute to understanding the extent of online services and e-participation across the globe. There may be more precise activities or norms within the public that explain the greater development of e-government that also can be measured. Wilson & Wong (2006), for example, demonstrate the importance of “information champions” in explaining variation in Internet
diffusion across African states. The appointment of a chief information officer could indicate an even stronger commitment by a nation to advancing democratic governance through technology. External leadership also may influence transformations in the public sector. Finnemore (1993) shows how the United Nations Educational, Scientific, and Cultural Organization (UNESCO) provided valuable educational assistance to nations in creating science bureaucracies after World War II. It may be that nations who are most interconnected and active with organizations such the UN’s Public Administration Network make greater use of technology to deliver government services. Nations can learn from other nations as well, and there are studies to suggest that nations adopt policy innovations from nations seen as their socio-cultural peers and from neighbors states have shown past success with new policies (Simmons & Elkins, 2004). Research by Lee, et al. (2011) showing that international organizations and neighboring countries positively influence online service provision offers initial support for these additional paths to e-government diffusion.

We hope that our findings will guide decision makers in capitals across the globe to take an active role in strengthening democracy, improving public sector performance, and also developing a healthy ICT sector. If properly guided, such changes should reduce inequalities in e-government and thereby allow the ongoing information and communication revolution to improve the lives of those in countries who have yet to benefit.
Vitae

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David Yates is an Associate Professor of Computer Information Systems at Bentley University. Dr. Yates’ research areas include computer networking, data communications, sensor networks, embedded systems, operating systems, and computer architecture. Before joining Bentley, David held research and academic positions at the University of Massachusetts and Boston University. In the corporate arena, he was a co-founder and vice president of software development at InfoLibria – a startup that grew to become a leading provider of hardware and software for building content distribution and delivery networks before it was acquired. With various colleagues, he holds several U.S. patents for processes and systems related to computer networking, content management, and mobile computing. He holds a PhD and MSc from the University of Massachusetts and a BSc from Tufts University.
## APPENDIX

### Summary of related work

<table>
<thead>
<tr>
<th>Operationalization of dependent variable</th>
<th>Ref.</th>
<th>Significant Variables</th>
<th>Non-significant Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMI</td>
<td>(Gulati &amp; Yates, 2011)</td>
<td>Human development index, Democracy, Financial investment index, Telecommunications competition index</td>
<td>Political freedom, Regulatory authority</td>
</tr>
<tr>
<td>WMI</td>
<td>(Lee, Chang, &amp; Berry, 2011)</td>
<td>International organization participation, Corruption, Human Capital Index, Internet users</td>
<td>Political freedom, Democracy, Population, GDP</td>
</tr>
<tr>
<td>WMI</td>
<td>(Moon, Welch &amp; Wong, 2005)</td>
<td>Government expenditures, Economic stability</td>
<td>Democracy</td>
</tr>
<tr>
<td>WMI</td>
<td>(Rose, 2005)</td>
<td>Political freedom, Corruption, ICT development, Economic wealth, Urbanization</td>
<td>None</td>
</tr>
<tr>
<td>WMI</td>
<td>(Srivastava &amp; Teo, 2007)</td>
<td>ICT development, Human capital index, Public institutions index</td>
<td>Macroeconomic environment</td>
</tr>
<tr>
<td>West</td>
<td>(Kim, 2007)</td>
<td>Civil liberties, Government effectiveness, Economic wealth, Education, Urbanization</td>
<td>Internet usage</td>
</tr>
<tr>
<td>West</td>
<td>(Moon, Welch &amp; Wong, 2005)</td>
<td>Internet hosts per 10,000, Economic stability</td>
<td>Democracy</td>
</tr>
<tr>
<td>West</td>
<td>(West, 2005)</td>
<td>Economic wealth, Technological expertise</td>
<td>Party competition, Civil liberties, Corruption, Internet usage, Education</td>
</tr>
<tr>
<td>EPI</td>
<td>(Lee, Chang, &amp; Berry, 2011)</td>
<td>Low corruption, Internet users, Population</td>
<td>Political freedom, Democracy, International organization participation, GDP</td>
</tr>
<tr>
<td>EPI</td>
<td>(Rose, 2005)</td>
<td>Corruption</td>
<td>None</td>
</tr>
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</table>
Table 1. Multiple regression analysis explaining online government services

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>Std. Err.</th>
<th>Std. B</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government performance [WGI] (H₁)</td>
<td>.239</td>
<td>.090</td>
<td>.402</td>
<td>.009</td>
</tr>
<tr>
<td>Telecom regulatory authority [ITU] (H₁)</td>
<td>.203</td>
<td>.078</td>
<td>.133</td>
<td>.010</td>
</tr>
<tr>
<td>Financial investment index (H₂)</td>
<td>.268</td>
<td>.118</td>
<td>.152</td>
<td>.025</td>
</tr>
<tr>
<td>Telecom competition index (H₃)</td>
<td>.172</td>
<td>.067</td>
<td>.174</td>
<td>.011</td>
</tr>
<tr>
<td>Democratic political structure [UDS]</td>
<td>-.196</td>
<td>.096</td>
<td>.221</td>
<td>.044</td>
</tr>
<tr>
<td>Education [Education Index]</td>
<td>1.284</td>
<td>.405</td>
<td>.219</td>
<td>.002</td>
</tr>
<tr>
<td>Urbanization [CIA]</td>
<td>.008</td>
<td>.003</td>
<td>.139</td>
<td>.003</td>
</tr>
<tr>
<td>Land area [CIA]</td>
<td>.056</td>
<td>.025</td>
<td>.122</td>
<td>.026</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-3.088</td>
<td>.311</td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

Dependent variable: Natural log of Online Service Index (OSI).
N = 171; Adjusted R Squared = 0.516; Std. Error of the Estimate = 0.650.
Table 2. Multiple regression analysis explaining e-participation capabilities

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>Std. Err.</th>
<th>Std. B</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government performance (H₁)</td>
<td>.256</td>
<td>.206</td>
<td>.228</td>
<td>.032</td>
</tr>
<tr>
<td>Telecom regulatory authority (H₁)</td>
<td>.069</td>
<td>.159</td>
<td>.047</td>
<td>.502</td>
</tr>
<tr>
<td>Financial investment index (H₂)</td>
<td>-.013</td>
<td>.157</td>
<td>-.006</td>
<td>.935</td>
</tr>
<tr>
<td>Telecom competition index (H₃)</td>
<td>.254</td>
<td>.086</td>
<td>.205</td>
<td>.004</td>
</tr>
<tr>
<td>Democratic political structure</td>
<td>-.033</td>
<td>.125</td>
<td>-.025</td>
<td>.793</td>
</tr>
<tr>
<td>Education</td>
<td>1.093</td>
<td>.601</td>
<td>.175</td>
<td>.044</td>
</tr>
<tr>
<td>Urbanization</td>
<td>.012</td>
<td>.004</td>
<td>.264</td>
<td>.001</td>
</tr>
<tr>
<td>Land area</td>
<td>.065</td>
<td>.032</td>
<td>.123</td>
<td>.043</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-3.713</td>
<td>.410</td>
<td>.123</td>
<td>.000</td>
</tr>
</tbody>
</table>

Dependent variable: Natural log of E-participation Index (EPI).
N = 158; Adjusted R Squared = 0.480; Std. Error of the Estimate = 0.806.
REFERENCES


