Understanding the Impact of Political Structure, Governance and Public Policy on e-Government

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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 United Nations. We analyze the impact of political structure, administrative culture and policy initiatives on both indices in approximately 160 countries. Our multiple regression analysis shows that when controlling for measures of economic and educational development, there is greater e-government capability in countries that have an administrative culture of sound governance and policies that promote the development and diffusion of information and communication technologies. These results hold in nations that are more democratic, even though political freedom (i.e., press freedom and civil liberties) appears to have a negative impact on e-government. These results suggest that the path to e-government leverages different strategies depending on a nation’s political structure, and that countries in which there is less political freedom may be utilizing e-government to maintain the status quo.

1. Introduction

E-government refers to the use of information and communication technologies (ICTs) by government agencies and political bodies to improve efficiency and transparency in government, improve communication with private industries, and improve the availability of information and delivery of services to citizens [10, 18, 30, 36]. E-government offers citizens the potential for greater access to their representatives and offers policy makers the ability to make citizen-to-government contact more inclusive. For the less fortunate and more isolated members of society, e-government and advances in technology can help overcome the geographical, institutional and social barriers to information and give marginalized groups a voice in the political sphere [13].

Because of the complex and multi-disciplinary nature of e-government, researchers disagree on the global state of e-government [12]. Most scholars see e-government as entering a second generation in terms of its development (e.g., [36]) while a few scholars see the promises of e-government as elusive (e.g., [14]).

Organizations that monitor the worldwide development and diffusion of e-government provide data that show that the concerns of the pessimists have not been unwarranted [41, 43]. These data and rankings show, however, that a number of less developed countries have succeeded in implementing comprehensive e-government services and rank higher than countries that are more developed [37]. At the same time, there is conflicting evidence regarding the relationship between political factors and e-government [9, 24, 28, 35, 42], indicating that other factors contribute to explaining e-government (e.g., as described in [21, 38, 44]).

The research question that we address in this study is: What is the impact of political structure, sound governance and public policy initiatives on e-government? A number of case studies seem to suggest that national public policy has encouraged development of a nation’s e-government capability [1, 3, 32]. Yet, it is impossible to make any valid generalizations on the contribution that political factors and public policies have in developing effective e-government. Moreover, most of the large-scale, cross-national studies have ignored the impact of policy initiatives on the ICT sector that, in turn, expand and improve e-government and hopefully encourage e-participation (e.g., [24, 28, 35]).

Our research examines the availability and quality of e-government services by analyzing the impact of several factors on recent United Nations’ global measurement of (1) online government services, and (2) electronic participation capabilities [6, 41]. We develop hypotheses on the impact that political structure, sound governance and public policy have on a nation’s e-government capability. To test our
hypotheses, we use multiple regression analysis to estimate the effects of structure, governance and policy variables on e-government in approximately 160 countries. Our analysis shows that most factors that affect the UN online service index (OSI) also affect the e-participation index (EPI). Some factors, however, are significant in affecting online services but not e-participation.

2. Background

Many countries have crafted strategies to increase the deployment and use of citizen-centric e-government services [31, 36]. Few studies, however, analyze the impact of political factors or public policy on more than one measure of national e-government. Most previous studies examine either the United Nations web measure index (e.g., [9, 37, 38]), which has been replaced by the online service index in the most recent UN survey [41], or West’s assessment of e-government performance (e.g., [24, 42]), which was first published in 2001 and has been updated as recently as 2008 [43]. Previous work by the first two authors of this study explored links between national strategy, competition and investment and web measure index measurements from 2007/2008 [9]. Furthermore, with the notable exception of work by Rose [35], none of this previous research has attempted to develop a viable model for e-participation capabilities. Finally, Moon et al. [28] compare determinants of the UN web measure index [39] and e-government performance, as presented in [42], and also metrics published by the Cyberspace Policy Research Group (see http://www.cyprg.arizona.edu/waes.html) and the World Economic Forum (see http://www.weforum.org/issues/global-information-technology).

In terms of political structure, these studies present conflicting results. For example, work that examined global e-government data prior to 2004 found that neither democracy [28] nor civil liberties [42] help explain e-government performance. Work that examines more recent data, however, suggests that stronger public institutions [38], greater democracy [9], and greater civil liberties [24] can improve e-government.

The connection between sound governance and superior e-government is more definitive. Measures of governance proposed by other researchers, however, have tended to be narrow in scope. Rose [35] found that control of corruption was an important factor in determining the quality of web-based government applications and services. More recently, Kim [24] found that government effectiveness was important in determining e-government performance.

Although public policy has advanced e-government in specific cases (e.g., [33]), this study analyzes the connection between public policy and online government services in general, and also e-participation services more specifically. King et al. highlight the importance of supply-side and demand-side policies and regulations in developing and deploying ICTs [25]. In order to perform our research, we developed and calculated two new indices to assess policies that promote the diffusion of ICTs and, in turn, the supply and demand of e-government in our earlier work [9]. On the supply side, we proposed a financial investment index that measures the financial investment and economic activity within and around a nation’s ICT sector. On the demand side, we proposed a competition index that measures the level of telecommunications competition within a country. Both indices are described more fully by Gulati and Yates [9] and are summarized below in Section 3.1.3.

Important findings from previous research are shown in the Appendix. Although evidence in previous studies is mixed, we hypothesize that after controlling for wealth, education and other variables explained in Section 3.2 below, that

(H1): A more democratic political structure, an administrative culture of sound governance, and public policy initiatives that promote diffusion of ICTs are associated with improved online government services.

There is no prior research or theoretical reasoning that links governance and e-participation. We therefore drop this factor in our hypothesis for e-participation:

(H2): A more democratic political structure and public policies that promote diffusion of ICTs are associated with improved e-participation capabilities.

It is almost certain that diffusion of innovations theory [34] is playing an important role in global e-government as it did in the spread of other information and communication technologies (e.g., [8]). It is therefore important that we consider factors that influenced the diffusion of earlier digital technologies in our own research. Examples of such factors include economic and educational development [29], and also Internet use and urbanization [2]. Even though the hypotheses above apply to developed [31] and developing countries [11], the theory on which this study is based [34] provides examples of how the same factors affect diffusion of innovations in different ways within societies at different levels of development.

With data we describe below, we test our two main hypotheses to gain an understanding of the role of political factors and policy initiatives in developing effective e-government.
3. Impact of structure, governance and policy on e-government

3.1. Data and methods

We test our hypotheses that a country’s political structure, governmental performance, and policy choices influence the level of e-government 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) [41]. 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 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.

3.1.1. Political structure. To account for the impact of democratic institutions and processes, we included the Center for Systemic Peace’s Polity2 score in 2009 [27]. This polity score aggregates 11 indicators of institutionalized democracy and 11 indicators of institutionalized autocracy into a single measure of democratic government. These indicators assess the competitiveness of political participation in the country, the openness and competitiveness of executive recruitment, and constraints on the government’s chief executive. Values on Polity2 range from -10 to 10, with Qatar and Saudi Arabia obtaining scores of -10 and 33 countries obtaining scores of 10. Countries “in transition” were assigned values of -11 (e.g., Afghanistan, Bosnia Herzegovina, and Iraq).

To measure political freedom, we standardized Freedom House’s 2010 indices for Press Freedom (a measure of the extent of the free flow of information) and Civil Liberties (a broad measure of the extent of free expression) and then combined the two indices to construct a political freedom index. Iceland, Finland, Norway and scored highest on this measure (1.35), whereas North Korea (−2.00), Myanmar and Turkmenistan (−1.92) scored the lowest. While the Polity2 score captures democracy at a structural level, the political freedom index captures how democratic values are practiced.

Based on these recent data from the Center for Systemic Peace and Freedom House, we speculate that:

(H1a): A more democratic political structure is associated with improved online government services; and

(H2a): A more democratic political system and greater political freedom are associated with increased opportunity for e-participation.
3.1.2. Governance. We measure the impact of governance with two independent variables. First, we used the six indicators from the Worldwide Governance Indicators (WGI) project [23] to assess the administrative culture 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. Data indicating whether or not a country had such a national regulatory authority for telecommunications in 2010 were obtained from the International Telecommunication Union’s ICT Eye database [16]. This variable was coded “1” if an independent authority was present in that year and “0” if it was not. In 2010, 64% of the countries had established an independent national regulatory authority for telecommunications.

To determine how governance practices and e-government are related, we hypothesize that:

(H1a): An administrative culture of sound governance is associated with an improved ability to deliver effective online government services; and

(H2a): An administrative culture of sound governance is not related to a nation’s e-participation capabilities.

3.1.3. Public policy. We reviewed a number of indicators in the World Bank’s World Development Indicators (WDI) database that could measure the financial investment and economic activity in and around the ICT sector. We constructed an additive index of seven indicators of a nation’s investment related to technological development. These seven indicators 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). Of the nearly 240 variables available in the WDI database, we selected these seven because of their connection to financial investment and induced economic activity in information or communication technology [9]. Once each indicator was computed, we then computed a financial investment index based on an average in the form of Z-scores of the indicators for each country.

We used six indicators to measure the extent of competition in the telecommunications sector. Relying on multiple indicators gauges a country’s general commitment to privatization, deregulation and promoting market competition. We aggregate several indicators into an index of competition that takes into account the level of competition in the industries that provide basic telephone service; mobile services; narrowband Internet service; DSL-based Internet service; cable-based Internet service; and cross-platform competition [9]. We refer to the single value that captures the overall competition in these markets as the telecommunications competition index.

The specific hypotheses connecting public policy initiatives, as described above, and e-government we postulate are:

(H1b): Policies that promote the development, access and use of information and communication technologies are associated with increased online government services; and

(H2b): Policies that promote the diffusion of ICTs are associated with increased e-participation capabilities.

3.2. Control variables

We include five non-political variables in our regression models that have a theoretical link to e-government or an empirical link shown in previous research. The first of these measures a country’s level of residential and commercial use of the Internet. Our indicator for Internet activity takes into account the percentage of households with Internet access in 2007 and the number of Internet hosts per ten thousand inhabitants in 2009. We standardized each of these variables and then used the mean of the two standardized variables to capture the extent of general Internet activity in each country. Data for the percentage of households with Internet access was obtained from the ITU [17] and the number of Internet hosts and the number of inhabitants were obtained from The CIA World Factbook [4].

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., [28,
In addition, people who have a higher level of education are more likely to demand that more services be made available over the Internet [24]. 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 [40] 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 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 also obtained from the CIA web site [4].

4. Data analysis and findings

4.1. Online government services

The results of the regression analysis of the log-transformed value for the online service index in 166 countries on the six political variables and five control variables are reported in Table 1. The 11 independent variables together explain 56% of the variance in the extent to which countries have government information and services online.

The coefficients for the polity scores in the first row are statistically significant at the .01 level and indicate that there is a strong connection between the presence of democratic political institutions and processes and the extent of e-government services. When holding all other variables constant, a one-unit increase in a country’s Polity2 score increases a country’s score on the online service index by 3.4%. To further illustrate, a country that has the mean value (2.9) on the polity score would have a score that was 44% higher on the OSI than a country that has the minimum Polity2 score (-10). And a country that has the maximum value (10) would have an OSI score that was 24% higher than a country with the mean value.

The coefficients for our second indicator of political structure—political freedom—also are statistically significant, but not in direction that we anticipated. Instead of increasing online services, we find that more open or free societies provide less government information and fewer services online. As a country’s political freedom score increases by 0.1-unit, its score on the online service index decreases by 4.0%. While countries such as Norway, Sweden, and Finland have the highest scores on our index of political freedom and are ranked within the highest quartile of scores on the OSI, many smaller nations such as Andorra, San Marino, Barbados, the Bahamas and Belize are ranked near the bottom on the OSI. And, at the same time, less free societies such as Bahrain, Jordan, Kazakhstan and Tunisia are ranked among the highest quartile of OSI scores. More detailed case studies are needed to understand the causal relationship between political freedom 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

| Table 1. Multiple Regression Analysis Explaining Online Government Services |
|-----------------------------|-------|-------|-------|-------|
| Democratic political structure [Polity2] (H1a) | 0.034 | 0.013 | 0.221 | 0.008 |
| Political freedom index (H1a) | -0.401 | 0.119 | -0.403 | 0.001 |
| Government performance [WGI] (H1b) | 0.437 | 0.154 | 0.402 | 0.005 |
| Telecom regulatory authority [ITU] (H1b) | 0.273 | 0.121 | 0.133 | 0.025 |
| Telecom competition index (H1b) | 0.183 | 0.066 | 0.174 | 0.006 |
| Financial investment index (H1b) | 0.287 | 0.119 | 0.152 | 0.017 |
| Internet activity [CIA & ITU] | -0.155 | 0.133 | -0.109 | 0.248 |
| Economic wealth [GDP Index] | 0.567 | 0.557 | 0.130 | 0.310 |
| Education [Education Index] | 1.179 | 0.452 | 0.219 | 0.010 |
| Urbanization | 0.006 | 0.003 | 0.139 | 0.082 |
| Land area [CIA] (Constant) | 0.046 | 0.025 | 0.100 | 0.064 |

Dependent variable: Natural log of Online Service Index (OSI). N = 166; Adjusted R Squared = 0.564; Std. Error of the Estimate = 0.627.
provide online services. Also, it may be the case that the absence of political freedom 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, there is mixed support for hypothesis (H1). The provision of more online services is associated with a democratic political system, but not with political freedom.

The coefficients for the WGI index in the third row are statistically significant at the .01 level and support the hypothesis that effective governance and administration increases the level of information and services a nation provides online (H1b). 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 4.4%. A country that has the mean value (-0.07) on the WGI index would have a score that was 10.3% 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 8.3% higher than a country with the mean value.

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 27% 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 0.05 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 (H1b).

The fifth 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 1.8% when controlling for all other variables. The coefficients are statistically significant at the 0.01 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 (H1c). Privatization and competition in 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 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 (H1c). 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 2.9% 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.

The coefficients for the control variables are shown beginning in the seventh row of data. We find that there is no relationship between the level of residential and commercial Internet use and the extent to which a government is online. The level of economic wealth also was not significant in explaining the variation in online services. The coefficients for urbanization and land mass are not statistically significant at the 0.05 level, but are significant at the 0.10 level. 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 online services by a substantial amount, almost 12%.

### 4.2. E-participation capabilities

The results of the regression analysis of the log-transformed value for the e-participation index in 158 countries on the six political variables and five control variables are reported in Table 2. The same 11 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 six of the political variables were statistically significant in the model of online services, only four are significant in the model of e-participation capabilities. 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. Political freedom is again significant, but still in a way that we did not anticipate. The coefficients for the polity scores in the first row are statistically significant at the .01 level and indicate that there is a strong connection between the presence of democratic political institutions and processes and government support for e-participation. When holding all other variables constant, a one-unit increase in a country’s polity score increases a country’s score on the e-participation index by 5.9%. To further illustrate, a country that has the mean value (2.9) on the polity score would have a score that was 76% higher on the e-participation index than a country that has the minimum polity score. And a country that has the maximum value would have an e-participation score that was 42% higher than a country with the mean value. The effect of democratic institutions is quite substantial on the level of e-participation and supports our hypothesis that a more democratic political structure increases the extent of country’s participatory e-government (H2a).

Table 2. Multiple Regression Analysis Explaining E-participation Capabilities

<table>
<thead>
<tr>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
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<tbody>
<tr>
<td>B</td>
<td>Std. Err.</td>
</tr>
<tr>
<td>Democratic political structure (H2a)</td>
<td>.059</td>
</tr>
<tr>
<td>Political freedom index (H2b)</td>
<td>-.515</td>
</tr>
<tr>
<td>Government performance (H2a)</td>
<td>.424</td>
</tr>
<tr>
<td>Telecom regulatory authority (H2a)</td>
<td>.080</td>
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<tr>
<td>Telecom competition index (H2b)</td>
<td>.208</td>
</tr>
<tr>
<td>Financial investment index (H2b)</td>
<td>.056</td>
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<tr>
<td>Internet activity</td>
<td>.081</td>
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<tr>
<td>GDP Index</td>
<td>.637</td>
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<tr>
<td>Education Index</td>
<td>.780</td>
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<td>Urbanization</td>
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<tr>
<td>Land area</td>
<td>.038</td>
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<tr>
<td>(Constant)</td>
<td>-3.945</td>
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</table>

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

The second row of data in Table 2 shows that there is a statistically significant and inverse relationship between the level of political freedom in a country and the opportunity for e-participation. A more open or free society is associated with less provision of participatory e-government tools and applications. As a country’s political freedom score increases by 0.1-unit, its score on the e-participation index decreases by 5.2%. As with the case of explaining online government services, there is mixed support for the hypothesis that a more democratic political structure is associated with a nation’s e-participation capabilities (H2a).

While there were both theoretical and empirical reasons to expect that more effective governance would increase the level of online services, we did not expect the same relationship to hold for e-participation. Yet, as the coefficients in the third row show, there is a strong and statistically significant relationship between the governance index and the e-participation index, supporting hypothesis (H2a). When holding all other variables constant, a 0.010-unit increase in a country’s WGI score increases a country’s score on the online service index by 4.2%. A country that has the mean value (-0.07) on the WGI index would have a score that was 10% 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 8% higher than a country with the mean value.

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. 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 has not been useful in promoting or even developing the corresponding higher level democratic means of citizen-to-government communication.

The fifth 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 OSI by more than 2% when controlling for all other variables. The coefficients are statistically significant at the 0.05 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 (H2a). In substantive terms, a country with the highest value on our index of competition (1.18) would score approximately 6.6% 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 in the sixth 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 coefficients for the control variables are shown beginning in the seventh row of data of Table 2. We find that there is no relationship between the level of residential and commercial Internet use, economic wealth or land mass and e-participation. In contrast with our model for online services, there is no relationship between education level and e-participation capabilities. Also in contrast to our first model, the coefficients for urbanization are statistically significant at the 0.05 level. Although not shown by this study, it may be the case that traditional participation is more common in urban areas and that urban residents expect that the practice be adapted to the Internet as well.

5. Conclusions and future work

Our research assesses the relationship of political factors and policy initiatives to improved e-government services and e-participation capabilities. After controlling for economic wealth, and also educational resources, we showed that countries that are more democratic, practice sound governance and encourage competition in the telecommunications sector evidence more extensive provision of e-government services. Specifically, these three factors have a positive and significant relationship with both the OSI and EPI [41]. An independent national telecommunications regulatory authority and greater financial investment in ICT development, as well as a more educated citizenry, also are positively related to the United Nations OSI. Greater urbanization is positively related to the EPI, but it is not significant for the OSI. However, in our models for the OSI and EPI, the independent variables together explained less than 60% of the variance in their respective measures of e-government. This percentage suggests that additional or alternative variables are needed to more fully explain a nation’s e-government capability.

Our most surprising finding was the negative relationship between the level of political freedom (i.e., press freedom and civil liberties) and e-government. Furthermore, this negative relationship holds for both the OSI and EPI. Taken collectively, these results suggest that the path to e-government leverages different strategies depending on a nation’s political structure, and that countries in which there is less political freedom may be utilizing e-government to maintain the status quo.

Case studies of China, Costa Rica and Cuba [15, 20, 26], 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 [20]. Corrales and Westhoff 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 [5]. Indeed, Ma, Chung and Thorson 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” [26].

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 [7]. Desai, Olofsgård and Youssef’s empirical evidence from 45 non-democratic states confirms the tradeoff of bundles of welfare benefits to secure public support. Jiang and Xu show that by providing limited improvement in administrative efficiency and transparency, Chinese provincial governments are able to deflate social tension and reestablish party legitimacy [19]. 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 [22].

The findings from our study have important implications for the further development of e-government. Although it is clear that a nation’s educational development is the most important factor in creating a vibrant system of e-government, we also find that democracy, governance and policy 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.

While we present strong evidence that democracy, governance and policy initiatives all matter, we also show that education matters more for leveraging the benefits of technology to provide greater effectiveness, efficiency and transparency in online government. Thus, we also show the limits that political structure, governance and policy have in improving e-government, at least in the short-term. We hope that our findings will guide decision makers in capitals across the globe to take an active role in strengthening democracy, improving governance, 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.

6. References

Appendix

Table 3 summarizes much of the related work described in Section 1 and Section 2 in a tabular form.

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Ref.</th>
<th>Significant Variables</th>
<th>Non-significant Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMI</td>
<td>[9]</td>
<td>Human development index, Democracy (Polity2), Financial investment index, Telecommunications competition index</td>
<td>Political freedom, National regulatory authority</td>
</tr>
<tr>
<td>WMI</td>
<td>[35]</td>
<td>Political freedom, Low corruption (Transparency International), ICT development (ITU), Economic wealth, Urbanization</td>
<td>None</td>
</tr>
<tr>
<td>WMI</td>
<td>[38]</td>
<td>ICT development (UN&amp;WEF), Human capital index (UN), Public institutions index (WEF)</td>
<td>Macroeconomic environment (WEF)</td>
</tr>
<tr>
<td>West</td>
<td>[24]</td>
<td>Civil liberties, Government effectiveness, Economic wealth, Education, Urbanization</td>
<td>Internet usage</td>
</tr>
<tr>
<td>West</td>
<td>[28]</td>
<td>Internet hosts per 10,000, Economic stability (World Bank)</td>
<td>Democracy (Freedom House)</td>
</tr>
<tr>
<td>West</td>
<td>[42]</td>
<td>Economic wealth, Technological expertise (UN)</td>
<td>Party competition (Norris), Civil liberties, Corruption, Internet usage, Education</td>
</tr>
<tr>
<td>EPI</td>
<td>[35]</td>
<td>Low corruption (Transparency International)</td>
<td>None</td>
</tr>
</tbody>
</table>