Does E-Government Promote Accountability? A Comparative Analysis of Website Openness and Government Accountability

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Under the global pressure of information technology, the adoption of web-based technologies in public administration has created a new government-and-citizen interface. However, whether e-government will unambiguously lead to a more transparent, interactive, open and hence, accountable, government remains a central question. Applying a framework of global pressure effects on bureaucratic change, this paper conducts an empirical study on website openness and accountability in fourteen countries. Even when overall accountability levels rise, the accountability gap between different national bureaucracies often remains intact as web-based technologies typically maintain or reinforce the existing practices. The question of whether e-government promotes accountability depends on what kind of bureaucracy one is referring to in the first place. In the current debate about global convergence and national divergence on the effect of globalization on public bureaucracies, the spread of e-government provides a case of convergence in practice rather than in results.

INTRODUCTION

E-government, the adoption of web-based technologies to deliver and conduct government services, has become a global trend in public administration. In 2000, there were 168 national governments that had their own websites. E-government often comes with a promise to improve public administration in terms of efficiency, one of the primary values in public administration (Lee and Perry; Heintze and Bretschneider; Rosenbloom). However, e-government has the potential to alter the traditional relationship between government and citizens by creating a new virtual government-and-citizen interface. With the popularity of e-government and the increasing interaction between government and citizens through the internet, a major question comes: To what extent does e-government promote public accountability?

Although accountability can be an elusive word in public administration, it often refers to the answerability of government to the public on...
its performance (Cunningham and Harris; Johnston and Romzek; Romzek and Dubnick). E-government is often viewed and promoted as a positive channel for enhancing government accountability and empowering citizens (La Porte, de Jong, and Demchak; Demchak, Friis, and La Porte 2000). More information delivered in a more timely fashion to citizens is expected to increase transparency of government, empowering citizens to more closely monitor government performance. Enhanced interactivity of the technology is also expected to improve government accountability as it makes government more responsive to the needs and demands of individual citizens.

However, there are arguments against this positive vision of e-government accountability. Information technology in public organizations often simply improves their technical efficiency without leading to significant organizational changes (Heintze and Bretschneider). Instead of changing the nature of organizations, the role played by information technology is often no more than reinforcing “existing tendencies” of organizations (Kraemer and Dedrick).

The empirical research has indicated that computing per se is neither a centralizing or decentralizing influence. The context in which computing is used is a much stronger influence on whether organizations centralize or decentralize than is the technology, which can support either type of arrangement. In general, computing tends to reinforce existing tendencies, and by itself is not likely to affect organizational structure in significant ways. (Kraemer and Dedrick, 101)

Applying this logic to the impact of e-government, the new technology may simply exacerbate the domestic trajectory, enhancing or reducing accountability levels based on domestic traditions, institutions, and circumstances. In fact, prior research seems to show that governments with an authoritarian or paternalistic nature use web-based technologies to control access to information for the purpose of monitoring citizen behavior to tighten political control of the regime (Welch and Wong 1998). From this perspective, the relationship between e-government and public accountability is a conditional one, where change in accountability levels depends on the context and characteristics of the public organization.

These two very different perspectives on the effect of e-government on accountability are linked to a fundamental question on the effect of global pressures on bureaucratic change. In the study of globalization, there is a heated debate on whether the global pressures, including the global pressure of information technology, will bring to a convergence or a divergence for the organization systems of different nations (Osborne; Pollitt; Doremus et al.; Hallerberg and Basinger; Kettl). If there is a direct and positive relationship between e-government and accountability, as suggested by the first paradigm, the convergence theory of globalization will be supported. With the establishment of more websites by more governments around the globe, these governments will converge to a global standard of accountability. In contrast, if the second paradigm is correct that
e-government accountability is contingent, the spread of e-government will instead lead to a divergence of accountability among countries and agencies of different contexts and characteristics.

To address the question of e-government’s effect on accountability and to shed more light on the impact of globalization, this article conducts an empirical study of the effect of e-government on accountability in fourteen countries. It compares the openness of the websites of e-governments of these countries and tests the impact of the contextual and organizational factors on their openness. This study attempts to answer the following questions. To what extent does e-government affect accountability of public bureaucracies? Will e-government lead to a global convergence in accountability or an accountability divergence among nations and bureaucracies? If there is any accountability divergence, what national and organizational characteristics may explain the differences? The paper is divided into the following sections: a theoretical framework for analysis of the effects of e-government on accountability; hypotheses predicting the effect of contextual and organizational factors on accountability; countries, data, and method; findings; and discussion.

A THEORETICAL FRAMEWORK OF GLOBAL PRESSURE AND E-GOVERNMENT ACCOUNTABILITY

This study takes advantage of a theoretical framework of global pressure and bureaucratic change to analyze the effect of e-government on changes in accountability (Welch and Wong 1998, 2001b). Globalization creates a new set of complex and interactive stimuli, demands, and opportunities in the external environment of national public bureaucracies, whose origin is not traceable to any particular nation. These stimuli, demands, and opportunities can be called “global pressures” as they are forces of a global scope that are putting public bureaucracies worldwide under pressure for change. Examples of global pressures include the global institution of multinational agreements, the information technology revolution, security against terrorism, prevention of corruption, empowerment of nongovernmental organizations, and the public management reform initiatives. As public organizations are open systems, affecting and effected by their environments, these set of global pressures may cause changes in structure, behavior, and other important organizational characteristics of public bureaucracies, including accountability (Selznick; Thompson; Aldrich; Rainey; Scott).

With the revolution of web-based technologies, the e-government movement can be taken as part of the global pressure of information technology. However, even though there is an identifiable set of global pressures, the response from each public bureaucracy is not necessarily homogenous. Both comparative public administration and globalization research suggest that, despite similar demands placed on national public bureaucracies by global pressures, patterns of adoption of technology and
organizational change are discernable and the domestic context surrounding public bureaucracy often acts as significant intervening factor. (Farazmand; Heady 1996b; Aberbach, Putnam, and Rockman; Riggs; Welch and Wong 2001a, 2001b). In elaborating their framework of global pressure and bureaucratic change, Welch and Wong (2001a) wrote:

The framework shows that global pressures affect public organizations directly and indirectly through domestic contexts. Despite significant variation in the structures and processes of public organizations worldwide, global pressures create common exigencies upon bureaucracies that result in predictable reactions or changes by public organizations. Moreover, the model suggests that elements of the domestic context filter the effects of global pressures in predictable ways. As a result, the domestic context either offsets or reinforces the change induced by the global pressure on public bureaucracy. (Welch and Wong 2001a, 511)

How will e-government affect accountability? In the framework, there are two major sources of change for accountability. First, the global pressure of information technology has a direct impact on accountability. Second, there is an indirect impact of change brought by the domestic context. In filtering the global pressure of e-government, the domestic context can either reinforce or offset the influence of e-government on accountability. It is possible that even if e-government leads to an increase in the mean accountability level of all nations, the accountability level of a particular government may still recede because its domestic context offsets the direct and positive impact of e-government on accountability.

Studies on the effects of global pressures on nations also have a potential to contribute to the debate on convergence theory: institutions in different countries, including public bureaucracy, tend to converge to a common pattern (Osborne; Pollitt and Bouckaert; Doremus et al.; Hallerberg and Basinger; Kettl; OECD 1993, 1995). The interesting and important questions are not only about convergence or divergence but also about the contextual factors that influence national level administrative change toward or away from the global trends (Pollitt; Scharpf; Welch and Wong 2001a). In this study, to specify the domestic context, we focus on two set of variables: the context of the national civil service system and the characteristics of the public agencies. The former has a more national and institutional focus and the latter has a more agency-specific and organizational focus.

Website and web-based technologies often form a core and indispensable part of any e-government. It is also the focus and contact point of the new electronic government-and-citizen interface created under e-government. We would therefore focus on the attributes of websites in operationalizing e-government accountability in the study. Different degrees of openness in websites can also expose public organization tendencies toward accountability (Welch and Wong 1998, 2001a). Change in the level of website openness represents the revealed level of change in accountability of the public agency.
The challenge for accountability in public administration is that many of the expectations for performance from multiple legitimate sources are often changing and contradictory (Cunningham and Harris; Johnston and Romzek; Romzek and Dubnick). However, citizens would not be able to hold their government accountable if they do not know what it is doing and have no channel for interacting with it. As long as public organizations are ultimately accountable to the citizenry, transparency and interactivity would be two critical elements for the accountability function of government.

The Cyberspace Policy Research Group (CyPRG) develops the connection between website openness and e-government accountability in its comparative research of websites with a focus on these two key elements of accountability.³ CyPRG defines government websites openness to be a function of transparency and interactivity. In the CyPRG study, transparency refers to the extent to which an organization reveals work and decision processes and procedures. Website transparency is equivalent to “a layman’s basic map of the organization as depicted in the information on the site [and] reveals the depth of access it allows, the depths of knowledge about processes it is willing to reveal, and the level of attention to citizen response it provides” (La Porte, de Jong, and Demchak). Interactivity refers to the quality of communication between agency and citizen. “[It] is a measure of the level of convenience or degree of immediate feedback [provided]” (La Porte, de Jong, and Demchak).

CyPRG hypothesizes that greater openness is associated with greater accountability (Demchak, Friis, and La Porte 1998, 2000; La Porte, de Jong, and Demchak). A more transparent government allows citizens to monitor the performance of public organizations more easily through the increase in the availability of information (Reichard). A more interactive public organization enhances accountability by being more responsive to the preferences of the citizenry. As our theoretical understanding of accountability is similar to the CyPRG constructs, this paper adopts CyPRG definitions and measures of website openness in measuring e-government accountability and uses publicly available data from CyPRG.

HYPOTHESES OF E-GOVERNMENT ACCOUNTABILITY

In general, there are two different approaches of measuring the impact of domestic context on e-government accountability. They are the direct measure approach and the indirect measure or interaction approach (La Porte, de Jong, and Demchak; Welch and Wong 2001a). The direct measure approach refers to the use of direct measurement of the domestic context, such as using the type of political regime and GDP per capita to capture the influence of political and economic dimensions of the domestic context, respectively. However, the use of the direct measure approach often leads to some major statistical problems in empirical studies.⁴ Prior research using many of the direct measures often resulted
in weak findings that explained little of the variations in website openness (La Porte, de Jong, and Demchak).\textsuperscript{5}

The interaction approach refers to using measurements that capture the interaction of the different segments of the domestic context (political, economic, social) for empirical analysis. There has been some success in experimenting the interaction approach to build empirical models to explain the impact of global pressure on bureaucratic change (Welch and Wong 2001a). The interaction approach is also attractive because it focuses on the interaction among the political, economic, and social dimensions of the domestic context. This approach makes it able to capture richer information and allow the analysis to get closer to the in-depth and profound meanings of the theoretical concepts applied in the study. It also allows researchers to benefit from the major concepts from well-grounded theories developed on the study of the public bureaucracy, such as the national civil service system. Because of the above reasons, this study adopts the interaction approach as its primary approach.\textsuperscript{6}

For hypotheses building, Heady (1996a) provides useful classifications of national civil service systems. Four major dimensions of Heady’s framework are adopted in the paper: relation to political regime, qualification requirements, role of state, and sense of mission.\textsuperscript{7} Overall, these dimensions serve as an index of the power or role of the civil service system in relation to other elite and power groups in either the major functions of the civil service system or the core domains of society.

The “relation to the political regime” construct concerns the power of the civil service. It ranges from minimal independent power, “ruler responsive,” to maximal power under a “military responsive” regime. “Qualification requirements” captures bureaucrat involvement in civil service qualification decisions. At one end, “patrimonial,” political rulers determine civil service qualifications, at the other, “bureaucratic determination,” civil servants are in charge. Because these two dimensions are thought to be measuring the same underlying construct, they are combined into a new variable “political autonomy” in our empirical analysis.

“Role of state” represents the degree of state intervention and penetration in decision making in the polity. This dimension can also be viewed as a measure of the degree of involvement or intervention by the civil service in society. It ranges from “traditional,” in which civil servants play a limited role, to “centrally planned,” where their role is the greatest.

The fourth dimension, “sense of mission,” captures civil service values. At one end of this scale, “compliance” requires strict conformity by bureaucrats to political directives, while at the other, “guidance” systems portray systems in which civil servants consider themselves to be most able to intervene, lead and direct. In systems in which guidance is the sense of mission, civil servants would express a tendency to dominate in public governance as they would view themselves as the “most legitimate
and best-equipped group for setting and achieving goals” (Heady 1996a, 220).

Because the adoption of information technology often occurs within a domestic context, hypotheses relate the dimensions of national civil service systems and organizational characteristics to concepts of e-government accountability. Two competing views provide two series of alternate hypotheses. On the one hand, a positive view can be taken on the accountability orientation of the civil service. Bureaucrats will have the natural tendency to respect accountability and the professional responsibility to attain it. Therefore, high political control and constraints imposed on the public bureaucracy can cause e-government accountability to be diminished. Following this thinking, we can assume that there should be a linear and positive relationship between the civil service dimensions and e-government accountability. E-government accountability should rise with the independence and power of the civil service in society.

While public bureaucrats are taken as professional and responsible managers in the positive approach, under the public-choice approach, there are alternative and negative views on the nature of the civil service. Like the power-seeking politicians, bureaucrats are self-interest-maximizing individuals (Niskanen; Downs). Once they are in control, they will do exactly what the politicians do to protect their power base, even at the expense of the interest of other political participants and the general public. Therefore, they must be monitored and constrained to a certain extent before accountable behavior can be expected from them.

In a global context, national polities may seek to stem the flow of power from the nation state to global institutions through national policies that protect their power and authority (Farazmand; Cleveland). As information is an important source of power, nations would tend to limit information disclosure and openness as one means of maintaining national political control under globalization (Kraemer and Dedrick; Cleveland). Similarly, bureaucrats who view themselves as legitimate leaders and enjoy a high level of independence may limit the ability of external entities to review decisions or contact responsible parties (Reichard). High concentration of power in the hands of the bureaucracy causes centralization and control of information by the bureaucracy in order to secure its own power.

With the two different and opposing views, two sets of competing hypotheses are set. Under the positive view, a linear and positive relationship is expected. Under the negative view, a nonlinear U-shaped relationship is expected. This means that only when the civil service is being situated in a competitive environment, with proper checks and balances from other political and social actors, will it take the virtue of accountability in e-government seriously.

These two sets of competing hypotheses are stated as below:
Linear relationship

H1: The greater the level of political autonomy of the civil service, the higher the e-government accountability of the public bureaucracy.

H2: The greater the role of state (civil service) in society, the higher the e-government accountability of the public bureaucracy.

H3: The greater the sense of mission of the civil service, the higher the e-government accountability of the public bureaucracy.

Nonlinear relationship

H4: High and low levels of political autonomy of the civil service lead to reductions in e-government accountability while a moderate level of political autonomy leads to increases in e-government accountability (U-shaped curve).

H5: High and low levels of the role of state (civil service) in society lead to reductions in e-government accountability while moderate levels of state role lead to increases in e-government accountability (U-shaped curve).

H6: High and low levels of sense of mission of the civil service leads to lower levels of e-government accountability while moderate levels of sense of mission of the civil service leads to higher levels of e-government accountability (U-shaped curve).

In setting up the hypotheses for organizational characteristics, we distinguish between internally focused (justice, education, and labor sectors) and externally focused agencies (defense, finance, and immigration). Internally focused agencies have missions primarily associated with national issues, while externally focused agencies have missions associated with a substantial international component. Externally focused agencies usually have a stronger need to use the internet to interact with parties outside the national border. Disclosure or availability of information is also a symbol of trust, modernity, and global citizenship that may be necessary for competitive vitality and political legitimacy of a nation (Strang and Meyer; DiMaggio and Powell). Therefore, it is hypothesized that:

H7: Bureaucracies of externally focused sectors have higher e-government accountability than those of internally focused sectors.

Finally, as the open economy is often believed to be a major driving force for e-government (Welch and Wong 2001b), it is hypothesized that:
H8: The more open the economy public bureaucracies face, the higher their e-accountability.

THE COUNTRIES, DATA, AND METHODS
Fourteen countries covering five continents are included in the study: Australia, Canada, China, Egypt, France, Germany, Indonesia, Japan, Korea, the Netherlands, New Zealand, Singapore, the United Kingdom, and the United States. These countries are chosen primarily because they represent a wide variation in the policy variables we are interested in for the study. Thus both developed and developing countries are included. Although they are not a random sample of all the e-government countries, they should still serve as useful reference points for similar countries in their respective regions.

The study uses two primary data sources: the CyPRG database on the transparency and interactivity of national agency websites and Ferrel Heady’s framework for distinguishing among civil service systems. Coding for the Heady constructs was based primarily on Heady’s own work. According to Heady’s work, each dimension is measured on a continuum from low to high. For example, the “relations to political regime” measures independent power of the civic service in a regime where nations classified as “ruler responsive” are coded between 1 and 2.5, nations coded as “single party responsive” are coded between 2.6 and 5.0, and so on. The maximum score for each dimension is 10.

CyPRG has collected data on website transparency and interactivity since the inception of the project in 1995. Transparency and interactivity are two elements of openness, which is considered to be a reasonable proxy measure of accountability. As mentioned above, transparency measures the amount of data available on agency websites and interactivity measures the ease with which users are able to access data or people (Demchak, Friis, and La Porte 2000; CyPRG 1; CyPRG 2). Both measures represent tallies of predetermined qualities of the agency website. The transparency measure represents tallies of website qualities in five areas (ownership, contacts, issue or organizational information, citizen consequences, and timeliness of data) and interactivity measures the presence or absence of qualities in four areas (ownership, reachability, issue or organizational information, and citizen consequences). Each of the substantive areas contains within it a set of measurable criteria which are scored 0 or 1 according to their presence or absence. Scores are summed across areas to provide an overall measure of transparency or interactivity. Openness is a linear sum of transparency and interactivity.

As we are primarily interested in bureaucratic change, we calculate the dependent variable as the score of 2000 minus the 1997 score. Change score has been found to be a better measure for accountability as it captures the dynamics of change and policy choice in e-government better.
Correlations between transparency and interactivity are high for 1997 ($r = 0.61$) and 2000 (0.62) data. Combining transparency and interactivity into one variable to represent openness has some merit as the Chronbach Alpha correlation coefficients is 0.75 and 0.77 for 1997 and 2000, respectively. National agencies from the fourteen countries that have a website data in 1997 and 2000 form the data for our study, a total of 267 agencies.

To measure national economic openness, we use a combined measure of 1997 exports as a percentage of GDP and 1997 imports as a percentage of GDP. Figures were taken from World Bank statistics (World Bank). For the external/internal focus variable, externally focused agencies were coded 1 and all others were coded 0. We also divided agencies into three groups: external political, economic and industrial, and domestic public service. The external political group included defense, executive, finance, and foreign agencies. The economic and industrial category included science and technology, communications, industry and trade, and transportation and infrastructure categories. The domestic public service group included culture, education, health, social services, and library-related agencies. As a final alternative, we coded a number of sectors as dummy variables and included them in the regression analysis. The three different coding techniques for agency-specific characteristics required three separate models.

Descriptive statistics for all variables are shown in Table 1. We conduct Ordinary Least Squares (OLS) regression analysis in which dependent variables of openness, transparency, and interactivity are regressed on measures of the civil service systems variables, the organizational characteristic variables, and the economic openness variable. For each regression, we recoded “political autonomy”, “role of state”, and “mission” into three-level dummy variables to test for nonlinear effects. The “mission” variable—the shared and self-perceived values of the bureaucrats on its role in society—is a critical variable that tests directly our two competing perspectives of the accountability orientation of bureaucrats. Therefore, to better test the two competing hypotheses, two sets of regression are run for the variable: one for the linear relationship and one for the nonlinear relationship.

FINDINGS

Figure 1 indicates that all the attributes of accountability (transparency, interactivity, and openness) generally increased across all countries between 1997 and 2000, with a substantial jump in both measures in 1999 and 2000. Aggregate findings indicate some support for the convergence theory that the general level of accountability of the countries has increased across time. However, this ignores that there are considerable variations among countries not only in terms of the level of accountability but also in terms of the slope and direction of change (see Appendices...
TABLE 1
Descriptive Statistics of Independent and Dependent Variables in the Study
(n = 267)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission</td>
<td>6.72</td>
<td>1.53</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Political regime</td>
<td>7.68</td>
<td>0.92</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Qualification requirements</td>
<td>8.11</td>
<td>0.79</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Role of state</td>
<td>5.45</td>
<td>1.28</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Personnel management</td>
<td>7.96</td>
<td>0.75</td>
<td>6.75</td>
<td>10</td>
</tr>
<tr>
<td>Political autonomy</td>
<td>7.89</td>
<td>0.78</td>
<td>4.5</td>
<td>10</td>
</tr>
<tr>
<td>External sector</td>
<td>0.47</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>External political sector</td>
<td>0.22</td>
<td>0.42</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Industry &amp; trade sector</td>
<td>0.09</td>
<td>0.28</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Domestic service provision</td>
<td>0.17</td>
<td>0.37</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Exports as a percent of GDP</td>
<td>35.34</td>
<td>34.17</td>
<td>10</td>
<td>187</td>
</tr>
<tr>
<td>Imports as a percent of GDP</td>
<td>33.27</td>
<td>30.40</td>
<td>9</td>
<td>170</td>
</tr>
<tr>
<td>Transparency change</td>
<td>6.21</td>
<td>4.34</td>
<td>–15.0</td>
<td>17.3</td>
</tr>
<tr>
<td>Interactivity change 1997–2000</td>
<td>5.61</td>
<td>4.34</td>
<td>–17.0</td>
<td>27.8</td>
</tr>
<tr>
<td>Openness change 1997–2000</td>
<td>11.83</td>
<td>7.62</td>
<td>–32.0</td>
<td>31.8</td>
</tr>
</tbody>
</table>

FIGURE 1
Website Data Trends (All Countries)

1 and 2 for individual trends of all fourteen countries). These differences are probably due to the elements of national and organization differences, the primary subjects of the study.

Findings from regression analysis are arranged into three tables (Tables 2, 3, and 4). Results from the regression analysis indicate relatively strong and consistent support for the set of nonlinear hypotheses. First,
findings in all three tables show generally consistent nonlinear effects of “role of state” on transparency, interactivity, and openness. Low and high “role of state” are very often found to be significantly negatively associated with transparency, interactivity, and openness. These findings

### TABLE 2
Regression Results (Standardized Coefficients) with External and Internal Sector Variable

<table>
<thead>
<tr>
<th></th>
<th>Transparency Change</th>
<th>Interactivity Change</th>
<th>Openness Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (medium reference)</td>
<td>7.11 (1.12)***</td>
<td>7.35 (1.20)***</td>
<td>14.45 (2.04)***</td>
</tr>
<tr>
<td>Mission</td>
<td>0.32 (0.16)**</td>
<td>-0.31 (0.17)*</td>
<td>0.01</td>
</tr>
<tr>
<td>Socioeconomic context</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-5.36 (0.66)***</td>
<td>-0.05 (0.70)</td>
<td>-5.42 (1.20)***</td>
</tr>
<tr>
<td>High</td>
<td>-1.34 (1.01)</td>
<td>-2.18 (1.09)**</td>
<td>-3.52 (1.84)**</td>
</tr>
<tr>
<td>Political autonomy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-1.83 (0.96)**</td>
<td>-3.73 (1.04)***</td>
<td>-5.55 (1.76)***</td>
</tr>
<tr>
<td>High</td>
<td>-1.56 (0.97)*</td>
<td>-2.51 (1.04)**</td>
<td>-4.07 (1.76)**</td>
</tr>
<tr>
<td>Economic openness</td>
<td>-0.08 (0.04)*</td>
<td>0.07 (0.04)</td>
<td>-0.01 (0.07)</td>
</tr>
<tr>
<td>External sector</td>
<td>0.37 (0.46)</td>
<td>1.03 (0.49)</td>
<td>1.40 (0.83)*</td>
</tr>
<tr>
<td>n</td>
<td>267</td>
<td>267</td>
<td>267</td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.30</td>
<td>0.18</td>
<td>0.23</td>
</tr>
<tr>
<td>Model significance</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
</tbody>
</table>

***p < 0.01, **p < 0.05, *p < 0.10.

### TABLE 3
Regression Results (Standardized Coefficients) with Sector Variables of External Political, Economic & Industrial, and Internal Public Service

<table>
<thead>
<tr>
<th></th>
<th>Transparency Change</th>
<th>Interactivity Change</th>
<th>Openness Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (medium reference)</td>
<td>7.69 (1.09)***</td>
<td>7.90 (1.19)***</td>
<td>15.59 (2.00)***</td>
</tr>
<tr>
<td>Mission</td>
<td>0.31 (0.15)**</td>
<td>-0.32 (0.16)**</td>
<td>-0.01 (0.27)</td>
</tr>
<tr>
<td>Socioeconomic context</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-5.10 (0.64)***</td>
<td>0.18 (0.70)</td>
<td>-4.92 (1.17)***</td>
</tr>
<tr>
<td>High</td>
<td>-1.11 (0.98)</td>
<td>-1.90 (1.07)*</td>
<td>-3.00 (1.79)*</td>
</tr>
<tr>
<td>Political autonomy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-1.69 (0.94)*</td>
<td>-3.80 (1.03)***</td>
<td>-5.49 (1.72)***</td>
</tr>
<tr>
<td>High</td>
<td>-1.47 (0.94)</td>
<td>-2.58 (1.02)**</td>
<td>-4.04 (1.71)**</td>
</tr>
<tr>
<td>Economic openness</td>
<td>-0.07 (0.04) *</td>
<td>0.08 (0.04)*</td>
<td>0.01 (0.07)</td>
</tr>
<tr>
<td>Sectors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External political</td>
<td>-1.16 (0.60)**</td>
<td>0.10 (0.66)</td>
<td>-1.06 (1.10)</td>
</tr>
<tr>
<td>Economic &amp; industrial</td>
<td>0.16</td>
<td>0.38 (0.62)</td>
<td>0.53 (1.04)</td>
</tr>
<tr>
<td>Internal public service</td>
<td>-2.49 (0.65)***</td>
<td>-2.39 (0.70)***</td>
<td>-4.88 (1.17)***</td>
</tr>
<tr>
<td>n</td>
<td>267</td>
<td>267</td>
<td>267</td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.34</td>
<td>0.21</td>
<td>0.23</td>
</tr>
<tr>
<td>Model significance</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
</tbody>
</table>

***p < 0.01, **p < 0.05, *p < 0.10.
support hypothesis H5. Websites in nations in which the role of the civil service is high and low tend to be less open than in nations with mixed competitive systems.

We also find consistent nonlinear relationship between “political autonomy” and transparency, interactivity, and openness for most regression runs. Excepting the transparency model in Table 3, all other results show that low and high political autonomy are negatively related while medium level of political autonomy is positively associated with transparency, interactivity, and openness. This suggests that in nations where either politicians or bureaucrats hold a high degree of independent power, website openness and hence accountability are lower than in nations where competitive mechanisms are more prevalent.

Tables 2 and 3 show the testing of the linear relationship of the mission variable. It is found to be positively associated with transparency but negatively associated with interactivity. The effects cancel each other out when mission is regressed on openness. This contradicts our expectation

### TABLE 4
Regression Results (Estimates and Standard Errors) Testing the Nonlinear Relationship of the Mission Variable

<table>
<thead>
<tr>
<th></th>
<th>Transparency Change</th>
<th>Interactivity Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (reference)</td>
<td>8.23 (0.95)***</td>
<td>7.83 (1.05)***</td>
</tr>
<tr>
<td>Mission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1.62 (1.72)</td>
<td>-3.97 (1.91)**</td>
</tr>
<tr>
<td>High</td>
<td>2.25 (0.86)***</td>
<td>-2.60 (0.95)***</td>
</tr>
<tr>
<td>Socioeconomic context</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-5.05 (0.68)***</td>
<td>-1.54 (0.75)**</td>
</tr>
<tr>
<td>High</td>
<td>-3.27 (1.58)**</td>
<td>1.52 (1.75)</td>
</tr>
<tr>
<td>Political autonomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-2.30 (0.90)***</td>
<td>-3.03 (1.00)***</td>
</tr>
<tr>
<td>High</td>
<td>-1.68 (0.92)*</td>
<td>-3.94 (1.02)***</td>
</tr>
<tr>
<td>Economic openness</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.03 (0.05)</td>
<td>-0.03 (0.05)</td>
</tr>
<tr>
<td>Sector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finance</td>
<td>0.29 (0.73)</td>
<td>2.33 (0.81)***</td>
</tr>
<tr>
<td>Industry &amp; trade</td>
<td>1.56 (0.75)***</td>
<td>0.60 (0.83)</td>
</tr>
<tr>
<td>Executive</td>
<td>-3.47 (1.23)***</td>
<td>-2.48 (1.37)*</td>
</tr>
<tr>
<td>Foreign</td>
<td>0.44 (0.92)</td>
<td>0.04 (1.02)</td>
</tr>
<tr>
<td>Culture</td>
<td>-5.39 (0.95)***</td>
<td>-5.67 (1.05)***</td>
</tr>
<tr>
<td>Government operations</td>
<td>2.79 (1.38)**</td>
<td>2.27 (1.53)</td>
</tr>
<tr>
<td>Justice</td>
<td>2.64 (0.73)***</td>
<td>0.92 (0.81)</td>
</tr>
<tr>
<td>Health</td>
<td>0.78 (1.15)</td>
<td>-0.73 (1.27)</td>
</tr>
</tbody>
</table>

| n         | 267    | 267    |
| Adjusted R-square| 0.44   | 0.30   |
| Model significance| ***    | ***    |

***p < 0.01, **p < 0.05, *p < 0.10.
that the direction of association between independent variables and transparency and interactivity would be the same.

Partly due to the problematic findings and partly due to our special interest in the mission variable, it is tested for nonlinear relationships in Table 4. Results show a positive linear relationship between mission and quantity of data (transparency), significant for high levels of mission orientation (H3 is partially supported). However, findings also show a nonlinear relationship with interactivity in which low and high mission levels are negatively associated but moderate levels are positively associated (H6 is also partially supported). All other results are similar with the models in Tables 2 and 3. The new findings appear to suggest that interactivity and transparency are measures of different phenomena. Therefore, we did not combine the two variables into the openness variable for this final set of regression. We interpret that these findings on the mission variable indicate two mechanisms of technology use by the bureaucracy or rulers in general. Different technology uses can have different implications on governance. The new findings imply that in countries where bureaucrats hold a stronger sense of mission, websites increasingly provide more data and information, but provide increasingly restricted access to the agency.

Findings also show consistent evidence that agency-specific organizational characteristics matter for accountability. In Table 2, external sector is significantly positively associated with openness. H6 is supported. In Table 3, recoding of the external/internal sector variable into three categories finds a negative relationship between public service sector agencies (health, education, etc.) and all three dependent variables. External political sector agencies (finance, trade, foreign) are also negatively associated with transparency. Many significant findings are also found for the sector variables in Table 4. The adjusted R-square is the largest for the regression model with dummy variables for the sectors. Therefore, in terms of explanatory power, using sector-based dummy variables to model interactivity, transparency, and openness is more appropriate and provides richer information. While the independent variables that represent Heady’s civil service dimensions show how the bureaucratic environment affects openness, agency-specific indicators show that organizational characteristics also determine how technology shapes accountability.

Finally, it is surprising to find that economic openness is not significant for website openness in all regression models. H7 is not supported. It is possible that when information technology becomes a common global pressure for nations and its technology is increasingly available and affordable, the normative and policy pressure to have an enhanced and sophisticated website may be more relevant than economic concerns and necessity. Accountability may have become more policy driven than economically and technically driven.
DISCUSSION

Consistent with existing research on information technology and organization change, this study finds that e-government often only exacerbates the existing nature and attributes of public bureaucracies (Bovens and Zouridis; Welch and Wong 2001b; Kraemer and Dedrick; Kraemer, Dedrick, and King). Information technology does not act out of context in affecting public organizations. E-government accountability is more about nations and bureaucracies than simply about technology per se.

The effect of e-government on accountability of public organization is affected both by the civil service system within which it is embedded and by its agency-specific organizational characteristics. The nonlinear and U-shaped bureaucratic response to e-government accountability suggests that bureaucrats think and behave as rulers to control information to consolidate power in their adoption and management of e-government. A pure administrative state governed by bureaucrats, without the checking of elected politicians and the civil society, may lead to a less accountable and open government (Aberbach, Putnam, and Rockman). A strong political regime with a weak civil service will also lead to similar drop in accountability. This implies that competition or proper share of power between the political elite and the civil service will be an important factor in determining whether e-government enhances or reduces accountability.

Adding on previous studies but following the same line of logic, our study shows that not only the general characteristics of the civil service affect accountability, the specific characteristics of agency also matter. Although there is no clear-cut generalization about the impact of the agency variables yet, it can be deducted from the findings that agencies often determine their website openness with a strategic mind-set on whom they see as their target user groups.

The set of interest groups relevant to government agencies can be classified into clients, those who receive the services, and constituents, who demand the service (Viteritti). If the website of the agencies is used to serve the clients but the clients do not happen to be the constituents who provide political support for the agencies, there may be a tendency for the agencies to provide less interactive and transparent services through their websites. This may explain why the executive political agencies have a negative relationship with transparency. Executive political agencies usually depend less on the website to communicate and cultivate their constituencies. Furthermore, a higher level of secrecy and isolation from the public can sometimes serve them well to prevent unnecessary exposure of information which can be politically dangerous to the agencies.

Departing from previous studies, however, our study poses the question that interactivity and transparency can each represent a differ-
ent dimension of the accountability relationship between citizenry and government under e-government. Findings show that the two attributes sometimes elicit different responses to the same domestic context. This means that transparency and interactivity can serve different and separated political and strategic functions for the bureaucracy. Bureaucrats can therefore use the web as a tool for information dissemination on the one hand while trying to use it to limit interaction on the other hand.

For example, in a civil service system of a high mission level, bureaucracies show greater transparency but place greater interactivity restrictions in their websites. More transparency may help the mission-oriented agency to “socialize” the public with the ideologies and visions of the agency. Governments can place what they want people to know, or what they believe they have a duty or desire to share in the public domain, yet, prefer to limit direct interaction. There is a danger that the new government-and-citizen interface created by e-government may simply be used as additional channel for more political propaganda and political control rather than real accountability enhancement. Considering the possibility of this, website establishment should not be taken automatically as an accountability enhancement without a careful evaluation of the website attributes.

To sum up, all the findings of the civil service system variables and agency-specific variables point to the same direction. Technology is often not adopted for the sake of acquisition alone, it is adopted and then adapted to meet institutional and organizational needs as defined by key decision makers. When the agency-specific organizational variables give the empirical model larger explanatory power, more contextual information of the public organizations are usually needed for more in-depth interpretation. Therefore, linking each major organizational variable with accountability of e-government more directly, pinpointing the relevancy of these variables, and further elaborating on the different dimensions of public accountability under e-government should be some of the major future directions of research in e-government.

Equally important, the study sheds some new light on the globalization debate of global convergence and national divergence on e-government. In some ways, convergence perspectives are upheld by our findings. With e-government, public accountability in general is increasing over time under the global information technology pressure. Nevertheless, important domestic factors result in divergence in e-government accountability at both the national and organizational levels. Although the direct effect of the global pressure of information technology, that is the adoption of e-government, will lead to a general and overall rise in accountability, the indirect effect of the domestic context will lead to a divergence in accountability among the countries and agencies.

As a result, the general level of accountability rises in a global sense but the accountability gap, the actual and absolute difference between
countries and agencies in accountability, will probably be maintained or even widened. In other words, the difference in accountability among nations and agencies cannot be narrowed simply by the introduction and spread of web-based e-government technology. This is similar to the effect of the internet in the business world. As internet is available for all firms, it ceases to be an advantage for enhancing a firm’s competitiveness over other firms (Porter). Similarly, as e-government technology is available for and adopted by most governments, it ceases to be the technology that makes a decisive difference in narrowing the accountability gap among governments of different nations.

As web-based technologies become widely available and affordable, e-government will become more policy driven than technology and economic driven. It will be the normative pressure of the global community and the domestic context that drive the growth and change of e-government (DiMaggio and Powell; La Porte, de Jong, and Demchak). Public accountability expressed by e-government will therefore become more and more a conscious policy choice that reflects both national and organizational characteristics.

Pollitt provides a very useful classification in summing up the convergence issues in globalization and public management. He carefully elaborates the concept of convergence and classifies four different stages of convergence: discursive convergence, decisional convergence, practice convergence, and results convergence. A significant contribution of his work is pointing out that convergence at one stage does not necessarily imply convergence at the next stage and the convergence process can be discontinued at any stage.

The significance of this for our analysis is that it supports our earlier suggestion that convergence could be taking place at one or more stages without necessarily doing so at all four. In other words there may be a considerable convergence of discourse and/or of decisions, without anything like the same degree of convergence of practice (and still less of results). (Pollitt, 487)

In e-government, it only converges up to the stage of practice in the sense that e-government has been widely adopted by nations around the globe. The adoption of the technology itself is a global convergence. However, the convergence of results in e-government in terms of accountability has not happened so far. Differences in national and organizational factors have led more toward national divergence, rather than global convergence, in public accountability under e-government.

Introducing e-government without the corresponding institutional reform of the civil service system and organizational reform of the agencies may only lead to limited success in enhancing accountability. The effect of technology on organizational change should therefore never be overstated. It is simply a myth that e-government will automatically and dramatically change the accountability nature of public organizations. The question of “whether e-government promotes accountability” cannot
be answered completely without knowing what kind of bureaucracy one is referring to in the first place.

ACKNOWLEDGMENT

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NOTES

1. According to the American Society for Public Administration (ASPA), e-government is defined as: “the pragmatic use of the most innovative information and communication technologies, like the internet, to deliver efficient and cost effective services, information and knowledge. It is an unequivocal commitment by decision-makers to strengthening the partnership between the private citizen and the public sector.” (definition taken from http://www.apsanet.org) Broadly speaking, e-government may also include the use of communication technologies other than the internet for service production and delivery. Because of the research purpose of the study, we will mainly focus on the use of internet and other web-based technologies in our study of e-government.

2. This statistics is taken from the government website data of the Cyberspace Policy Research Group (CyPRG), available online at http://www.cyprg.arizona.edu.

3. CyPRG is a research group funded by the National Science Foundation and is based at the University of Arizona, Tucson and George Mason University. It has collected data on the openness of websites of national governments in the world since 1996.

4. Because of the high correlation among the direct measures, multicollinearity is one of the major statistical problems encountered by the approach.

5. For example, in an empirical study conducted by La Porte and his colleagues (La Porte, de Jong, and Demchak), among all the direct measures of the domestic context they use, website openness is found to be related with national income and similar wealth measures. All the direct social and political measures are found to be insignificant.

6. Partly due to the data nature and limitation, the direct approach will also be applied in operating some of the variables in the study, such as economic openness and some of the agency-specific organizational characteristics.

7. One of the dimensions of Heady, the focus for personnel management, is not adopted in the study. To a certain extent, this dimension is slightly different in nature from other dimensions. Instead of capturing the relative power of the civil service in different domains of society, it tends to capture more about the locus and operational arrangement of the personnel function. Second, prior work has found high correlation between the two variables: “role of state in society” and “focus for personnel management” (Welch and Wong 2001a). A similar result was found in this data set (r = 0.47), however, the Chronbach Alpha was not high enough (r = 0.58) to merit a combination of these variables. Problems of multicollinearity preclude the
inclusion of both variables in the regression model. As a result, “focus for personnel management” was dropped from the model. This variable also has the lowest intercoder correlation and the least variation among nations.

8. “Relation to political regime” and “qualification requirements” capture the political autonomy of the civil service in relation to the political regime in internal and external affairs respectively. There are also statistical reasons to back up such combination. Preliminary analysis found high correlation \( r = 0.71 \) between two coded categories from the Heady framework. The Chronbach Alpha coefficient was 0.82, validating a linear combination of the standardized variables into a new variable that we call “political autonomy.”

9. The competing views relate to traditional views on the accountability orientation of bureaucracies. This debate can actually be dated back to the debate between Finer and Friedrich.

10. These sector distinctions were developed and coded by CyPRG.

11. The coding of seven countries (Egypt, France, Indonesia, Japan, Korea, the United Kingdom, and the United States) are done by Heady in his own work (1996a). The other eight countries are coded by the researchers independently according to the Heady characteristics. Readers can refer to Welch and Wong (2001a) for more explanation of the coding method and samples of the coding results. The coding results are then averaged to obtain one measure of each dimension for each country. Intercoder reliability, measured as the correlation between the two sets of researcher-coded data, ranged between 0.89 and 0.94.

12. CyPRG data and the detailed definition of each criterion are available online at http://www.cyprg.arizona.edu. Although the titles of some interactivity and transparency areas are identical, the measurement qualities are not. We do not reprint the criteria here due to space considerations.

13. Because relatively few websites were assessed in the first two years of the CyPRG study, we rely on the most recent four years of CyPRG data from 1997 through to 2000.

14. A weakness of average score of accountability is that it is only a measure of a single point. It often reflects “momentary lags in technology application, familiarity with new processes or other transitory phenomena,” instead of policy choices of government. The change score measures the change in the level of e-government accountability of a government across time in comparison with its own accountability in previous years. As a comparison and change measure, it can measure the degree of willingness of public officials and managers to make their organizations more accountable through e-government when the technology, knowledge and experience of allowing them to do so are already available.

15. The alpha correlation coefficient between these two variables was high enough \( r = 0.98 \) to validate a linear combination of the standardized variables.

16. For example, the interactivity gap between the US and France has been significantly narrowed in 2000. At the same period, the interactivity gap between France and the Netherlands has been significantly widened.

17. All models are statistically significant and statistical tests show that normality assumptions were not violated and that there were no problems of multicollinearity.

18. Subsequent runs of this model, alternatively replacing low and high dummy variables with the medium dummy variable, showed similar evidence of a strongly significant nonlinear relationship.
19. In Table 2, economic openness is not significant for interactivity. Although it is significant for transparency in both Table 2 and Table 3, it has the wrong sign and very small coefficients.

20. According to Porter, the adoption of internet in the business world will not give the firm a sustainable competitive advantage. As the internet technology becomes widely available to all firms, it will mean that no firm will have a competitive edge by the use of the internet. Therefore, what internet does is raising the competitiveness of all firms, instead of the relative competitiveness of any specific firm. It changes the competition landscape at the market level, but will not give any individual firm a competitive edge in competing in the new landscape.

REFERENCES


Cyberspace Policy Research Group (CyPRG), 1. Available online at http://www.cyprg.arizona.edu/hypo_content.htm

Cyberspace Policy Research Group (CyPRG), 2. Available online at http://cyprg.arizona.edu/cqms_content.htm


**APPENDIX 1**

**Website Transparency Trends**

![Website Transparency Trends Graph](image-url)
APPENDIX 2
Website Interactivity Trends

![Website Interactivity Trends Graph](image-url)