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# Examining the anti-corruption effect of e-government and the moderating effect of national culture: A cross-country study

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## ABSTRACT

This study addresses whether e-government influences the level of corruption control in a cross-country view. To that end, it examines the influence of e-government service maturity on corruption control considering international-level political, economic, and cultural differences. The path analysis on the relationships among various global indicators reveals that e-government service maturity contributes to controlling corruption, and national culture moderates the anti-corruption effect of e-government. Cross-country disparities in political, economic, and cultural conditions influence the variation in the impact of e-government on corruption control. While convincing evidence that affluent democracies can control corruption more effectively than other countries is presented, an examination of cultural moderation finds that national cultures characterized as having unequal power distribution and uncertainty avoidance have a decreased anti-corruption effect of e-government.

## 1. Introduction

Much research has analyzed the determinants of country-level corruption. An increasing number of countries are joining anti-corruption movements specified as e-government strategies, open government initiatives (e.g., U.S. Open Government Initiative and the Open Government Partnership), and transparency efforts in terms of data, information, and policy processes. Meanwhile, traditional conditions such as political and economic factors exert determining effects on levels of corruption. Whether national endeavors (projects, programs, or initiatives) for controlling corruption can outperform the traditional antecedents of corruption has become an inquiry for in-depth research. E-government is increasingly considered an important manifestation of such national anti-corruption endeavors (Bannister & Connolly, 2011; Bertot, Jaeger, & Grimes, 2010, 2012; Cho & Choi, 2004; Choi, 2014; Kim, Kim, & Lee, 2009). Regarding this rising recognition, the paper asks the following research question: given political and economic conditions, does e-government service maturity influence corruption control?

While political and economic conditions can be considered as national capacity for anti-corruption, a wide array of studies have argued that the extent to which national efforts for anti-corruption achieve goals, whether in a digital form or not, can differ across national cultures (e.g., Husted, 1999; Park, 2003; Seleim & Bontis, 2009; Zhao, Shen, & Collier, 2014). Only a few studies, however, have captured a culture-based account of e-government effects (Khalil, 2011; Singh, Das, & Joseph, 2007). Specifically, a research gap lies in the dearth of

empirical and rigorous research addressing cultural influence on the anti-corruption effect of e-government-driven openness and transparency efforts compared with ample literature regarding the culture-corruption relationship. This study aims to fill the gap, raising another research question: given political and economic conditions, does national culture moderate the cross-national effect of e-government on corruption control?

To answer the two research questions, this study establishes a path model that captures the relationships among various global-scale indicators. The rest of the article is structured into five sections. Section 2 explains the theoretical and empirical backgrounds of corruption control and e-government's anti-corruption effects. Section 3 describes the data, variables, and measurements of this cross-national study. Section 4 reports the results of the path analysis. Section 5 discusses theoretical implications, practical suggestions, and research limitations. Section 6 concludes this article.

## 2. Theoretical and empirical background

## 2.1. Modernization theory

Fundamental arguments for the theoretical suggestion of this study are drawn from modernization theory (Barker, 2005; Bernstein, 1971; McClelland, 1967), which helps explain the influences on social change, development, and progress. The theory focuses on macro-environmental facets such as political enlightenment, economic growth, and technological progress. In line with the purpose of this study, further

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application of the theory covers the impact of technological advancement across societies (Barker, 2005). This study aligns key terminologies of the theory with political capacity, economic capacity, e-government (as technological advancement), and corruption control (as social change and development).

The theory extends to the contention that modernized societies would utilize and benefit from services made by emerging technologies compared to less technologically-sophisticated societies (Barker, 2005). If e-government is an innovative, recent stimulator of social change, countries that possess macro-environmental resources and capacities (political democracy and economic capital) would be better poised to accomplish e-government actions than their counterparts, for which accomplishments are restricted to basic-level benefits in an initial phase of e-government maturity (Azad, Faraj, Goh, & Feghali, 2010; Layne & Lee, 2001; Norris, 2001; Singh et al., 2007). This study considers anti-corruption to be one of the accomplishments of social change. However, modernization would fail if a society did not have requisite factors such as human resources (McClelland, 1967). Therefore, human capital should be considered in the relationships of political capacity, economic capacity, and e-government as technological progress, with anti-corruption as social progress. In addition, modernization theory considers the influence of contextual conditions (Barker, 2005). The impact of macro-environmental capacities on social progress can depend on the cultural context. Fig. 1 simply illustrates modernization theory.

The remaining part of this section discusses corruption as a socially undesirable status, political-economic capacities as traditional determinants of country-level corruption, e-government maturity as technological progress, and the relation of e-government maturity to other components. This section then considers national culture as a contextual component and discusses how diverse dimensions of national culture influence country-level corruption. Finally, a review of the literature backs the proposal of a research framework specified as a path model.

## 2.2. Corruption as a target of modernization

Corruption is a universal (i.e., existing across time and place) and pathological (i.e., undermining the effectiveness and legitimacy of governments, the political system, and the market system) phenomenon (Choi, 2014: 219). Observing the pervasive global phenomenon, many scholars have tried to refine this concept. Definitional components of corruption help explain it as a concept for research. As McMullan (1961: 184) stated, corruption is an *illegal* act by definition. Because a common understanding regards corruption as exploiting public authority for private gains (Aladwani, 2016), the deviation from *public* responsibilities for the pursuit of *private* interests is central to the concept. Corruption appears in various types of illegal financial and/or administrative behaviors conducted by individuals with public jobs or duties for their own private tangible and/or intangible benefits. The representative types comprise bribery such as kickbacks and pay-offs,

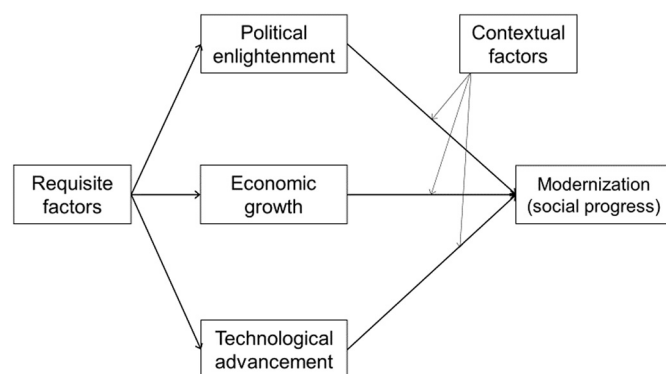


Fig. 1. The simple illustration of the modernization theory.

embezzlement or misappropriation, nepotism shown as favoritism and preferential treatment, abuse of public authority, and extortion profiting by coercive means (Caiden, 2001; Caiden & Caiden, 1977; Rose-Ackerman, 1975, 1978, 1996, 1999).

## 2.3. Traditional determinants of corruption: political-economic capacity

Causes of corruption have been of keen interest to academics. For example, research inquiries such as the determinants of corruption, the reasons for corruption, and the proneness of some countries to corruption over others have attracted consistent attention (Choi, 2014: 219). An array of studies has highlighted macro-level determinants of corruption (Abu-Shanab, Harb, & Al-Zoubi, 2013; Aladwani, 2016; Doig & Theobald, 2000; Klitgaard, 1988; McMullan, 1961; Rose-Ackerman, 1999; Shleifer & Vishny, 1993; Treisman, 2000; Wraith & Edgar, 1963). Their country-level and cross-country findings have commonly revealed that corruption is deeply rooted in political and economic capacities.

Politics-based corruption primarily results from coercive powers found in a closed, non-competitive political environment of the developing world (Doig & Theobald, 2000; Hardoon & Heinrich, 2013). Existing studies (Das & DiRienzo, 2009; Park, 2003; Serra, 2006) have derived reasons and sources of coercive political powers invoking corruption from institutional and practical suppression of political rights. The extent to which basic political rights are guaranteed in practice influences the extent to which politically coercive authoritative powers are exercised for corruption (Saha, Gounder, & Su, 2009; Serra, 2006). Promotion of political rights reflects the overall level of democracy, which implies the constitutional and actual guarantee of freedom of expression, freedom of association, and freedom of the press.

Not only democracy but also economic prosperity offers an advantage for country-level corruption control. Despite variances within similar levels of economic wealth, there is a strong association between economic prosperity and economy-based corruption. Expectedly, economic prosperity has a negative relationship with level of corruption (Choi, 2014: 220). According to Lipset (1960), advanced economies—characterized as having more access to better education, greater literacy, and more impersonal relations—can detect and deter corrupt behaviors of government officials more easily than less developed economies. Economic prosperity can produce economic freedom and economic globalization. Economic liberalism is more prevalent in relatively wealthy countries. Economic freedom enhanced through economic liberalism dampens corrupt behaviors, encouraging economic openness and discouraging insecurity in economic relations (Graeff & Mehlkop, 2003; Shen & Williamson, 2005). Goel and Nelson (2005) found that economic freedom matters more than political freedom when trying to reduce corruption. Economic liberalization based on a high level of economic freedom notably influences the effect of democracy on corruption (Saha et al., 2009). As such, liberalism-driven economic globalization can promote economic freedom and decrease the level of corruption (Akhter, 2004). For example, participants in international trade or aid organizations should follow rules and regulations for economic globalization that force countries to reduce domestic corruption, and currently wealthy countries can afford to comply with those external requirements (Sung & Chu, 2003; Williams & Beare, 1999).

## 2.4. E-government as a corruption reducer

An increasing number of studies have touted e-government as an effective tool for combating corruption and improving transparency in developing countries (e.g., Abu-Shanab et al., 2013; Andersen, 2009; Bertot et al., 2010, 2012; Bhatnagar, 2002; Cho & Choi, 2004; Choi, 2014; Ciborra, 2005; Corojan & Criado, 2012; Elbahnasawy, 2014; Kim, 2014; Krishnan, Teo, & Lim, 2013; Shim & Eom, 2008). Cumulated evidence underscores substantial relationships of e-government services with anti-corruption performances (Bannister & Connolly, 2011; Bertot

**Table 1**  
Dimensions of national culture.

Cultural dimensions	Description
Power distance	The degree to which the less powerful members of a society accept and expect that power is distributed unequally
Individualism	A preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families
Masculinity	A preference in society for achievement, heroism, assertiveness and material rewards for success
Uncertainty Avoidance	The degree to which the members of a society feel uncomfortable with uncertainty and ambiguity.

Source: Hofstede (1980, 1983).

et al., 2010; Meijer, 2009) and the positive effects of e-government use on perceived transparency of and trust in government (Grimmelikhuijsen, Porumbescu, Hong, & Im, 2013; Im, Cho, Porumbescu, & Park, 2014; Im, Porumbescu, & Lee, 2013; Porumbescu, 2013, 2016a, 2016b, 2016c).

E-government has the potential to control corruption through transparency. As transparency is an expectedly negative correlate of corruption, there is a tautological confusion between the concepts. Lindstedt and Naurin (2010) avoided the conceptual confusion by claiming that “transparency may indeed be an important remedy against corruption” (p. 302). For instance, transparency in electronic taxation works as a successful solution to corruption-related problems in many countries (Bertot et al., 2010: 265). The Seoul Metropolitan Government’s Online Procedures Enhancement (OPEN) system provided anytime and anywhere access for anyone to file civil applications (permits, registrations, procurements, contracts, and approvals) and monitor his or her status, thereby diminishing the abuse and misuse of bureaucratic discretion in citizen-government transactions and enhancing the accountability of public officials in charge of each case (Cho & Choi, 2004; Kim et al., 2009; Lee, 2009).

Accordingly, e-government can play a vital role in fighting corruption by increasing public access to information, empowering civil society to oversee the state, enabling citizens to track government decisions and actions of public employees, and substantially reducing the costs of transparency efforts (Bertot et al., 2010; United Nations Office on Drugs and Crime, 2004). Seeing e-government as one of the critical solutions to corruption, Bhatnagar (2003) argued that “by making rules simpler and more transparent, e-government emboldens citizens and businesses to question unreasonable procedures and their arbitrary application” (p. 30).

While many believe that e-government can realize desirable effects such as anti-corruption, empirically examining the effects requires an agreed-upon approach to conceptualization and methodology. This study is based on an empirical conceptualization of e-government that is appropriate for examining both its expected effects and the determining influences of antecedents on its development. Extant studies used the level of “e-government maturity” to measure the development and growth of country-level e-government in an evolutionary view, which assumes its stage-wise development (Andersen & Henriksen, 2006; Davison, Wagner, & Ma, 2005; Layne & Lee, 2001; Moon, 2002; West, 2004, 2005). The view is specified with such sequential phases as online presence (catalogue), increasingly complex transactions, and interaction with citizenry. This trajectory is called e-government maturity, which is the extent to which a government has established an online presence (West, 2005).

E-government maturity necessarily promotes transparency by increasing the access to government. Transparency increased by anytime and anywhere online access to transactions, services, documents, and databases makes it difficult for government bureaucrats to engage in corrupt behaviors. Furthermore, e-government at a mature level makes it easy for citizens to voice their concerns and provide civic input (Jaeger, 2006). Transparency enhanced by e-government maturity enables the anti-corruption potential of national e-government. Based on this discussion, the study establishes the following hypothesis:

**H1.** E-government maturity has a positive influence on corruption

control.

## 2.5. National culture in the context of corruption

Given cultural distinctions across countries, the acceptability of objectively corrupt behavior and susceptibility to corruption differ considerably across countries (Aladwani, 2016; Park, 2003; Treisman, 2000). While some countries consider nepotism and cronyism as socially acceptable behavior, others consider it to be culturally unacceptable as well as illegal and immediately punishable (Mbaku, 1994). Hofstede (1980) defined national culture as “the collective programming of the mind which distinguishes the members of one human group from another” (p. 260). He originally created multiple dimensions of national culture. Among them, power distance, individualism (versus collectivism), masculinity (versus femininity), and uncertainty avoidance are noteworthy for a cultural context of country-level corruption. Table 1 defines the four cultural dimensions.

The conceptualization of each cultural dimension offers contextual explanation of the likelihood and degree of corruption. Certain cultural characteristics might foster circumstances in which individuals cognitively and sentimentally accept or reject corruption. In addition, national culture, through its collective influence on technological adoption, acceptance, and utilization, can affect the extent to which the desirable effects of e-government are accomplished. Thus, national culture matters for e-government readiness and ultimately e-government functions (Khalil, 2011). Zhao et al. (2014) argued that “national culture, as a source of acceptable norms and behaviors, may influence the public’s online expectations, preferences, and experiences and its attitudes toward e-government” (p. 1006). Therefore, national culture influences the anti-corruption effect of e-government in two ways; this effect depends on the degree of corruption-proneness in the culture and the degree of technological-friendliness in the culture. Whether the dimensions of national culture moderate the anti-corruption effects of e-government (the second research question addressed in the introduction) can be examined by testing the following hypothesis.

**H2.** The dimensions of national culture moderate the effects of e-government on corruption control.

The power distance dimension deals with how a society handles inequalities among people. High power distance cultures with hierarchical order create deleterious environments for corruption (Park, 2003: 35–36). In such cultures, subordinates (i.e., non-power holders) rarely challenge illegal power use by superiors or become whistleblowers for fear of retaliation. Meanwhile, individuals in low power distance societies can strive to equalize the distribution of power and demand justification for inequalities of power (Cohen & Nelson, 1994; Hofstede, 1983; Victor & Cullen, 1988). In addition, those in countries with low power distance are more likely to adopt technological innovation (e-government) for social progress than are people in countries with high power distance (Zhao et al., 2014).

**H2a.** High power distance culture decreases the effect of e-government on corruption control.

Collectivism, in contrast to individualism, is characterized by conformity (personal dependence on groups), obedience, and loyalty. This

in-group culture would likely discourage criticism, opposition, and whistle-blowing and thereby encourage a generous attitude toward corruption (Cohen & Nelson, 1994; Park, 2003: 36). On the contrary, individualistic cultures centered on the equitable administration of justice do not tolerate conspiracy at the level needed for widespread corruption. In the aspect of technology adoption, high in-group collectivist cultures prefer face-to-face communication for maintaining relationships and thus tend to communicate at a lower level of information technology use (Bagchi, Hart, & Peterson, 2004; Erumban & De Jong, 2006). A strong social emphasis on in-group collectivism does not welcome the active use of e-government and thus ultimately weakens its anti-corruption potential (Khalil, 2011; Zhao et al., 2014: 1008).

**H2b.** Individualism culture increases the effect of e-government on corruption control.

Masculine cultures prioritize quantitative improvements, independence, and achievement in terms of power, wealth, and status, whereas feminine cultures stress qualitative improvements, interdependence, relationships, and the welfare of the weak (Hofstede, 1980, 1983). Masculine cultures that venerate scale and speed tend to value big and fast achievements above legitimacy and social justice and seldom stigmatize corruption performed in pursuit of big, fast success (Brademas & Heimann, 1998; Hofstede, 1983; Vitell, Nwachukwu, & Barnes, 1993). In a similar vein, studies of gender egalitarianism (minimizing gender role differences) have revealed a spread of corruption in countries with a masculine culture (Eckel & Grossman, 1998; Emrich, Denmark, & Den Hartog, 2004; Seleim & Bontis, 2009; Swamy, Knack, Lee, & Azfar, 2001). These studies also consistently found that women are less involved in bribery and networks of corruption. Masculine countries that bolster high gender egalitarianism (less respect for female roles) are more likely to be corrupt.

**H2c.** Masculine culture decreases the effect of e-government on corruption control.

Another factor at play is uncertainty avoidance, which involves how a society deals with the unknown future. Ensuring survival in high uncertainty avoidance cultures is of more importance than ensuring legitimacy. Individuals under such cultures often have a high level of “status strain” (Lipset & Raab, 1970) and “structural strain” (Merton, 1968), by which social status and structure pressure them to commit crimes and deviations (corrupt behaviors) when they feel torn between socially acceptable, desirable goals, and the means to achieve those goals. Individuals tend to take actions to diminish anxiety and uncertainty, including corruption, if the actions aid their survival. Hofstede (2003) has posited that low-uncertainty-avoidance cultures make greater use of a relatively recent technological innovation, the Internet, than do high-uncertainty-avoidance societies. Existing studies have reported a negative association between uncertainty avoidance and e-government use (Arslan, 2009; Kovačić, 2005b; Zhao, 2013).

**H2d.** High uncertainty avoidance culture decreases the effect of e-government on corruption control.

## 2.6. Research framework

Bertot et al. (2010) claimed that e-government alone can have a limited impact on the reduction of multifaceted corruption because various political, social, institutional, and cultural conditions matter for national technological initiatives. In line with this claim, the classical logic (Fig. 1) arising from modernization theory should be adapted to scrutinize the relationships between e-government in global diffusion and other theoretical components. Since modernization theory considers human capital as an important requisite factor, the relationship of human capital with political-economic capacities and technological progress (e-government) needs to be clarified in the research

framework. Many studies (e.g., Azad et al., 2010; Chen, Chen, Huang, & Ching, 2006; Das, Singh, & Joseph, 2017; Srivastava & Teo, 2008; Stier, 2015; Wong & Welch, 2004) have found evidence that political capacity (often considered political democracy and governance) affects the diffusion and development of e-government as innovation efforts. Especially, political governance (comprising liberal democracy, political stability, government effectiveness, regulatory quality, and rule of law) is critical to e-government maturity on a global level (Srivastava & Teo, 2008). A low level of economic capital (mainly measured as income or gross domestic product per capita) as an economic condition for social progress (Ifinedo & Davidrajah, 2005; Siau & Long, 2006; Singh et al., 2007) and human capital (mainly measured as educational attainment) as a social capacity (Ifinedo, 2012; Kovačić, 2005a; Moon, 2002) fundamentally inhibit e-government from reaching a mature phase. An accumulation of empirical evidence strongly supports that economic development and human capital heavily affect e-government maturity (Baliamoune-Lutz, 2003; Caselli & Coleman, 2001; Kiiski & Pohjola, 2002; Pick & Azari, 2008; Shirazi, Ngwenyama, & Morawczynski, 2010; United Nations, 2016). Singh et al. (2007) provided global evidence that economic capital influences human resource development and political governance, which lead to e-government maturity. Human capital development helps upgrade the democratic capacity at the country level (Fukuyama, 2001; Gerring, Thacker, & Alfaro, 2012; Putnam, 1995). The research framework in Fig. 2 illustrates the relationships discussed up to this point.

## 3. Data and methods

This study creates a dataset of global-scale indicators in 2016 derived from four sources. Table 2 reports the descriptive statistics.

The outcome variable (corruption control) and political capacity are derived from the homepage (govindicators.org) of the World Governance Indicator (WGI). The WGI subindicator, Control of Corruption, measures experts' perceptions of “the extent to which public power is exercised for private gain, including both petty and grand forms of corruption.” Because corruption as an undercover activity rarely leaves obvious trails in paper or digital records, it is difficult to develop an objective gauge of corruption. Instead, empirical research has relied upon the WGI's Control of Corruption or the Transparency International's Corruption Perception Index, which are highly correlated with each other. This study uses the former as an effective surrogate of the outcome variable because its standardized scores have an advantage for estimation in regression-based analysis and theoretical interpretation (corruption control as social progress). The variable, political capacity, is sourced from WGI's Voice and Accountability, which captures experts' perceptions of “the extent to which citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.” Both corruption control and political capacity have normalized values. This study uses the log values of gross domestic product (GDP)

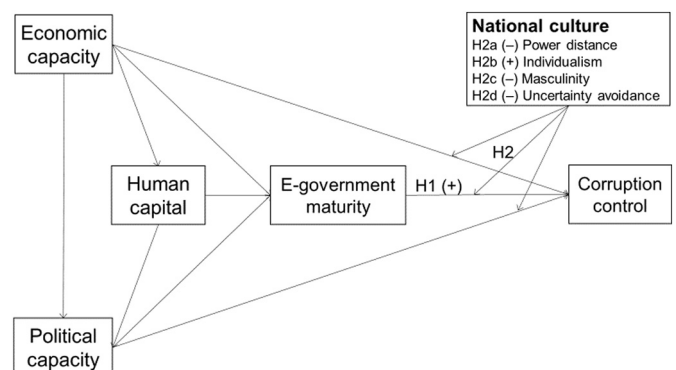


Fig. 2. The research framework.



**Table 2**  
Descriptive statistics and pairwise correlation.

	N	Mean	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
[A] Corruption control	209	0.00 (1.00)								
[B] Political capacity	204	0.00 (1.00)	0.76*							
[C] Economic capacity	179	4.00 (0.51)	0.65*	0.41*						
[D] E-government	191	0.39 (0.27)	0.64*	0.40*	0.71*					
[E] Human capital	191	0.66 (0.20)	0.61*	0.54*	0.81*	0.64*				
[F] Power distance	102	64.27 (20.82)	−0.66*	−0.66*	−0.42*	−0.46*	−0.46*			
[G] Individualism	102	38.86 (21.98)	0.64*	0.63*	0.57*	0.49*	0.57*	−0.66*		
[H] Masculinity	102	47.42 (18.57)	−0.16	−0.12	0.04	0.03	−0.01	0.09	0.06	
[I] Uncertainty avoidance	102	64.21 (21.44)	−0.17	0.02	0.19	0.09	0.21	0.16	−0.13	0.03

Note: Standard deviations in parentheses; economic capacity is a log value of per capita GDP, of which mean is \$17,982 with standard deviation of \$19,901.

\*  $p < 0.001$ .

per capita as economic capacity representing economic prosperity. The GDP values in 2016 are available from the World Bank's homepage.

The key explanatory variable, e-government, captures the maturity of e-government services. The study uses the Online Service Index included in the United Nations E-Government Survey (UN E-Gov) dataset in 2016. UN experts and volunteer researchers assessed national portals (national government, e-service, and e-participation portals) and the homepages of the ministries pertinent to education, labor, social services, health, finance, and environment affairs (United Nations, 2016: 138). As discussed in the preceding section, e-government reaches a mature level through the guarantee of unlimited access to various kinds of public information, transparent transactions in various kinds of service offerings, and increases in participatory and interactive opportunities. These actions can directly contribute to corruption control.

Human capital is also measured with the UN E-Gov's Human Capital Index, consisting of four components: "adult literacy rate," "the combined primary, secondary and tertiary gross enrolment ratio," "expected years of schooling," and "average years of schooling" (United Nations, 2016: 136–137). These four components represent various facets of educational attainment as a reliable proxy of human capital.

The cultural data were downloaded from the Hofstede Center ([geert-hofstede.com/national-culture.html](http://geert-hofstede.com/national-culture.html)). Geert Hofstede has developed and refined assessments of national culture dimensions, and the Center has publicized the only unique source of quantitative worldwide evaluation of national cultures. This study uses the four dimensions described in Table 1 as moderating variables pertinent to national culture. These variables are graded with values from 0 to 100.

To examine the hypotheses that modernization theory puts forth, this study employs a path analysis. The path analysis assumes that measured (observed) variables are perfect manifestations of latent variables, and thus this study assumes that the key explanatory variables completely reflect the core concepts of modernization theory. This analysis aims to investigate the relationships among only measured variables. It is appropriate for examining the determining and mediating effects of e-government on corruption control. Causal effects (direct, indirect, and total effects) on the path diagram and path model fit indices are estimated through structural equation modeling (SEM) methods. Path coefficients are not different between ordinary least squares (OLS) estimation and SEM-based estimation, but SEM allows for estimation of the standard errors of total effects and goodness of fit indices while OLS cannot. To compare the relative importance in magnitude of coefficients, this study uses the standardized values of all variables. Because cultural data cover a smaller number of countries than other global indicators, the result of examining the moderating effects of cultural dimensions (102 countries) is compared with that of examining the significance of paths in the model without including cultural effects (179 countries).

#### 4. Results

Before reporting the results of the path analysis, bivariate relationships need to be discussed in terms of correlation and scatterplots. As described in Table 2, the proxy variables of the three (political, economic, and technological) components derived from modernization theory have high correlation with each other and with corruption control. The outcome variable is more correlated with the level of liberal democracy as political capacity ( $r = 0.76$ ) than with the level of economic prosperity ( $r = 0.65$ ). E-government maturity is more associated with economic condition ( $r = 0.71$ ) than with political capacity ( $r = 0.40$ ). Human capital is also considerably correlated with other global indicators; specifically, the indicator of educational attainment is strongly associated with economic prosperity ( $r = 0.81$ ).

While power distance and individualism show a salient correlation with other explanatory variables, their correlations with masculinity and uncertainty avoidance do not appear to be significant. Expectedly, power distance and individualism are negatively correlated with corruption control and explanatory variables. The scatterplots of Fig. 3 portray the overall patterns of the relationships of the four cultural dimensions with corruption control. Power distance and individualism have a comparatively visible pattern in the bivariate relationships with the level of corruption control. Fig. 3 suggests that power distance and collectivist cultures would have difficulty in controlling corruption. Masculinity and uncertainty avoidance alone do not have a specific pattern in their relationship with corruption control.

Table 3 reports the results of the path analysis not considering the moderating effects of cultural dimensions. This path analysis examines the application of modernization theory to the impact of e-government maturity on corruption control. The path model consists of four regressions with political capacity, human capital, e-government maturity, and corruption control as dependent variables. Economic capacity determines human capital and political capacity. National e-government matures with a high level of economic capacity and human capital, while the influence of political capacity on e-government is not significant. The analysis signifies corruption control as an ultimate outcome of the three triggers of modernization for social progress. As a result of the path analysis, H1 is supported. Given political and economic capacities, e-government can help reduce corruption at the country level.

Table 4 reports the results of the path analysis considering the moderating effect of cultural dimensions. Paths other than cultural moderations have similar effects to the results in Table 3. Political-economic capacity and e-government significantly predict the national level of corruption control. H2 postulating the moderating effects of cultural dimensions is supported in the influence of power distance (H2a) and uncertainty avoidance (H2d). National cultures with individualism (H2b) and masculinity (H2c) do not moderate the anti-corruption effect of e-government. High power distance cultures, which assume power inequality, make it difficult to challenge corrupt

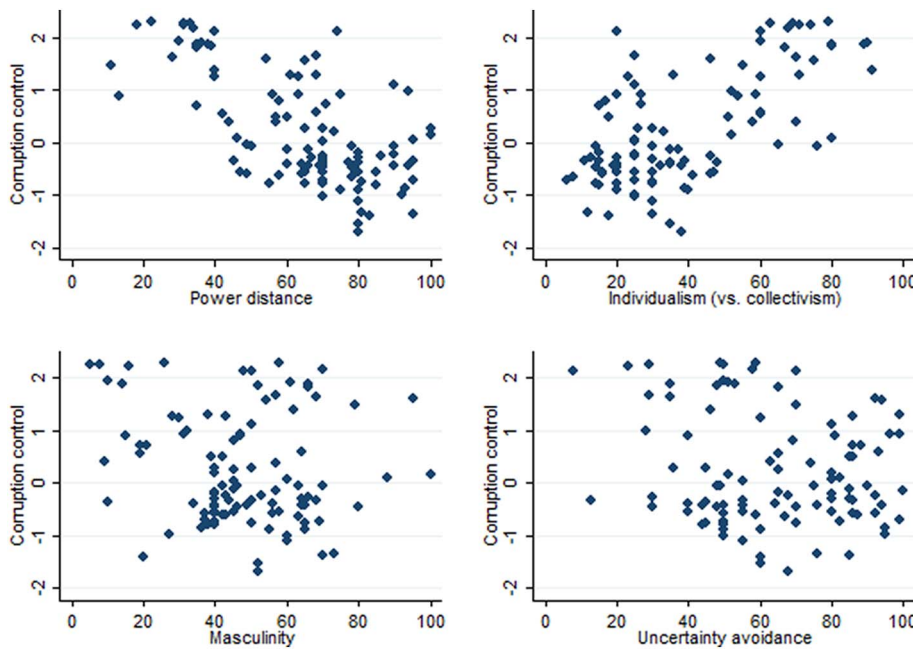


Fig. 3. Scatterplots of corruption control versus cultural dimensions.

behaviors performed by people with power (Park, 2003: 35–36) and to enthusiastically accept technological innovation for social moderation (Zhao et al., 2014). In high uncertainty avoidance cultures, most individuals can commit corrupt behaviors in daily life to reduce uncertainty arising from status and structure (Arslan, 2009). These two cultures constrain the use of e-government for its expected purposes to very superficial performance in the early phase of e-government maturity (Kovačić, 2005b; Zhao, 2013). This study does not posit the cultural moderation of the political and economic determining effects on corruption control as a hypothesis, but finds that the contextual (cultural in this study) conditions of modernization theory influence the political and technological effects of modernization efforts on social progress outcomes. While none of the four cultural dimensions moderate the determining effect of economic capacity on corruption

control, the anti-corruption effect of political capacity is substantially lower in high power distance, collectivism, and masculine cultures.

Because power distance and uncertainty avoidance cultures turn out to moderate the anti-corruption effect of e-government, the relationships between those two cultures and e-government service maturity deserve deeper discussion. Table 5 categorizes countries in terms of their e-government maturity level and the two cultural dimensions. The top highest and lowest 10 countries in terms of power distance culture, uncertainty avoidance culture, and e-government service maturity were sorted out, and then the countries belonging to the typology of Table 5 were identified. No country falls in the category of countries that rank low (the lowest 10) in both power distance and e-government maturity. Expectedly, the lower ranked groups of power distance and uncertainty avoidance that have well-established e-government maturity chiefly

Table 3  
The path analysis not including cultural dimensions.

Outcome	Predictors	Direct effect	Indirect effect	Total effect
Political capacity (Adjusted $R^2 = 0.26$ )	Human capital	0.496* (0.077)		0.496* (0.077)
	Economic capacity	0.204* (0.070)	0.271* (0.051)	0.475* (0.069)
	Constant	-0.035 (0.062)		
Human capital (Adjusted $R^2 = 0.31$ )	Economic capacity	0.547* (0.061)		0.547* (0.061)
	Constant	0.016 (0.060)		
E-government (Adjusted $R^2 = 0.52$ )	Political capacity	0.074 (0.062)		0.074 (0.062)
	Economic capacity	0.376* (0.062)	0.251* (0.045)	0.628* (0.059)
	Human capital	0.418* (0.071)	0.037* (0.031)	0.455* (0.064)
	Constant	0.038 (0.052)		
	Corruption control (Adjusted $R^2 = 0.77$ )	Political capacity	0.549* (0.039)	0.014 (0.012)
	Economic capacity	0.355* (0.045)	0.285* (0.051)	0.640* (0.055)
	E-government	0.187* (0.046)		0.187* (0.046)
	Human capital		0.357* (0.051)	0.357* (0.051)
	Constant	-0.055* (0.035)		
N = 179	Log likelihood = -994.349			
The path model's goodness of fit	Likelihood ratio test: $\chi^2 = 0.144$ , p-value = 0.705			
	Root mean squared error of approximation = 0.000 [ $< 0.05$ ]			
	Standardized root mean squared residual = 0.002 [ $< 0.05$ ]			
	Comparative fit index = 1.000 [ $> 0.9$ ]			
	Tucker-Lewis index = 1.017 [ $> 0.9$ ]			
	Akaike's information criterion = 2000.70			
	Bayesian information criterion = 2076.88			
	Coefficient of determination = 0.572			

Standard errors in parentheses; and cutoff in brackets.  
\*  $p < 0.05$ .

**Table 4**  
The path analysis including cultural dimensions.

Outcome	Predictors	Direct effect	Indirect effect	Total effect
Political capacity (Adjusted $R^2 = 0.35$ )	Human capital	0.486* (0.103)		0.486* (0.103)
	Economic capacity	0.147* (0.068)	0.296* (0.072)	0.443* (0.083)
	Constant	0.065 (0.077)		
Human capital (Adjusted $R^2 = 0.41$ )	Economic capacity	0.609* (0.073)		0.609* (0.073)
	Constant	0.134 (0.073)		
E-government (Adjusted $R^2 = 0.50$ )	Political capacity	0.042 (0.088)		0.042 (0.088)
	Economic capacity	0.351* (0.086)	0.250* (0.064)	0.601* (0.071)
	Human capital	0.379* (0.100)	0.020 (0.043)	0.399* (0.090)
	Constant	0.318* (0.067)		
Corruption control (Adjusted $R^2 = 0.81$ )	Political capacity	0.567* (0.077)	0.010 (0.020)	0.577* (0.079)
	× Power distance	-0.172* (0.076)		-0.172* (0.076)
	× Individualism	0.273* (0.098)		0.273* (0.098)
	× Masculinity	-0.233* (0.073)		-0.233* (0.073)
	× Uncertainty avoidance	-0.018 (0.057)		-0.018 (0.057)
	Economic capacity	0.310* (0.072)	0.390* (0.070)	0.700* (0.077)
	× Power distance	-0.030 (0.064)		-0.030 (0.064)
	× Individualism	-0.010 (0.080)		-0.010 (0.080)
	× Masculinity	0.141 (0.087)		0.141 (0.087)
	× Uncertainty avoidance	-0.007 (0.070)		-0.007 (0.070)
	E-government	0.232* (0.068)		0.232* (0.068)
	× Power distance	-0.016* (0.006)		-0.016* (0.006)
	× Individualism	-0.095 (0.068)		-0.095 (0.068)
	× Masculinity	0.058 (0.063)		0.058 (0.063)
	× Uncertainty avoidance	-0.088* (0.041)		-0.088* (0.041)
	Human capital		0.368* (0.075)	0.368* (0.075)
	Constant	-0.249* (0.057)		
$N = 102$	Log likelihood = -865.956			
The path model's goodness of fit	Likelihood ratio test: $\chi^2 = 7.845$ , $p$ -value = 0.644			
	Root mean squared error of approximation = 0.231 [ $< 0.05$ ]			
	Standardized root mean squared residual = 0.016 [ $< 0.05$ ]			
	Comparative fit index = 0.984 [ $> 0.9$ ]			
	Tucker-Lewis index = 0.838 [ $> 0.9$ ]			
	Akaike's information criterion = 1055.697			
	Bayesian information criterion = 1099.814			
	Coefficient of determination = 0.634			

Multiplicative variables (moderating effects of cultural dimensions) marked with the multiplication sign (×); standard errors in parentheses; and cutoff in brackets.  
\*  $p < 0.05$ .

includes western countries. Deviations in corruption control scores are not large among countries within this group. While these democratic, wealthy countries with low power distance and uncertainty avoidance look homogenous in exercising anti-corruption effects of e-government, other categories of countries show larger within-group deviations in current corruption control levels.

Notable deviations of corruption control exist within two categories: countries with low power distance and less developed e-government, and countries with high uncertainty avoidance and well-developed e-government. As this path analysis reveals, high power distance and high uncertainty avoidance cultures weaken the anti-corruption effect of e-government in many countries. However, the national corruption level of Bhutan is not high despite its high power distance and low-level e-government, and the uncertainty avoidance culture in Japan and Uruguay, unlike Russia, does not influence the national level of corruption. Although the influence of two cultural dimensions has the same directionality in cultural moderation of technology-driven anti-corruption effects, power distance and uncertainty avoidance are

distinctive in terms of the cultural effects. For example, while Guatemala and Ukraine belong to the group of less developed e-government and the highest level of the two cultural dimensions, Bhutan, has a unique culture characterized as high power distance but low uncertainty avoidance. Some countries listed in Table 5 may diverge from mainstream findings and become outliers or extreme cases for this path analysis, but understanding cultural and contextual impacts will help better explain the results of the analysis. Countries within an identical category of the typology have similar cultures, but the cultures can have different effects on corruption control across countries.

## 5. Further discussion

### 5.1. Theoretical implications

This study examines the effect of e-government on corruption control, considering the political, economic, and cultural conditions of country-level corruption. E-government itself can be a manifestation of

**Table 5**  
Countries in the lowest-highest ranks of technological-cultural dimensions.

	10 lowest-level e-government		10 highest-level e-government	
Power distance	10 lowest		New Zealand (0.5%), U.K. (6.2%), Austria (10.0%)	
	10 highest	Bhutan (19.1%), Guatemala (73.7%), Ukraine (85.2%), Iraq (95.7%),	United Arab Emirates (17.7%), Malaysia (34.4%), Saudi Arabia (40.7%)	
Uncertainty avoidance	10 lowest	Bhutan (19.1%), Jamaica (52.6%), Nepal (64.6%)	Sweden (1.9%), Singapore (3.3%), U.K. (6.2%)	
	10 highest	Suriname (66.0%), Guatemala (73.7%), Ukraine (85.2%)	Japan (9.1%), Uruguay (11.5%), Russia (80.9%)	

Note: Top 100% order in terms of corruption control score in parentheses.

information and communication technologies to improve government operations and citizen-government relationships. The technological upgrade of government operations might help citizens and government agencies to control corruption, but this technology-driven or technology-centered view has a limitation in accounting for nationwide corruption deeply embedded in the political, economic, and cultural aspects of an individual country. Meanwhile, researchers would like to investigate the net impact of emerging technologies on controlling corruption given political, economic, and cultural conditions. This study can improve the rigidity of the investigation by comprehensively considering important theoretical determinants of country-level corruption control as social change achieved by national modernization.

Contemporaries have contended that corrupt behaviors prevail in less democratic and poorer states. Yet, the contention does not go beyond confirming the determining effects of political-economic conditions. From the view of modernization theory, e-government can be considered technological innovation for social progress, reflecting various purposeful actions (government policies, programs, projects, initiatives, and even a collection of individual and/or organizational efforts) for social change, whether long-term or short-term, rather than given preconditions. However, existing studies often lack a theoretical background even if some of them empirically proved the desirable effects of e-government. This study connects country-level anti-corruption effects of e-government with modernization theory, thereby applying a classical solid theory to recent government actions of technology utilization.

This study contributes to guiding further research on culture-based corruption by highlighting the cultural moderation of political, economic, and technological anti-corruption effects. Certain cultures make it easier for individuals to tolerate corruption as a socio-culturally acceptable behavior. As Bertot et al. (2010) asserted, a critical success factor to reduce corruption is a culture of transparency embedded within a country's governance system. However, certain cultures can nurture political and economic soils of corruption; in turn, political and economic antecedents can reinforce corruption-prone cultures. You and Khagram's (2005) culture-based account of how political and economic inequality can cause corruption is noteworthy: "Inequality adversely affects social norms about corruption and people's beliefs about the legitimacy of rules and institutions" (p. 136). While improving political and economic prerequisite conditions cannot come easy and fast, one might think that technological innovation such as e-government promises relatively deliverable potentials for anti-corruption. However, as this study found, national cultures of power distance and uncertainty avoidance significantly weaken the anti-corruption effects of e-government. Researchers need to develop a deeper understanding of these cultures, which become a formidable barrier to achieving e-government goals.

### 5.2. Practical suggestions

The main findings offer two lessons to international and domestic practitioners who manage anti-corruption strategies and transparency initiatives. First, while some findings fortify the deterministic stance toward country-level corruption, others might inspire global society with efficacy of anti-corruption endeavors. The level of liberal democracy considered as political capacity for social progress cannot change radically in a short term through government drives. Instead, e-government services for transparency by opening data and information empower citizens to monitor government operations, and this mechanism can be more easily achieved than more costly endeavors for enhancing political and economic capacity.

Second, practitioners should pay attention to variances within a group of similar cultural characteristics. The discussion of Table 5 supports this assertion. National culture stemming from an individual country's tradition, history, and legacy might have a much stronger impact on corruption than predetermining effects of political and

economic preconditions. However, certain countries enjoy successful fruits of anti-corruption efforts driven by e-government initiatives, whereas others in similar cultures fail to deter corruption to a substantial extent. The difference originates from two sources: external forces such as globalization and policy learning and internal forces such as national leadership and commitment. These two forces exert a combined impact. One cannot consider globalization motivated by international organizations as an easy solution to deep-rooted corruption. Foreign enforcement has often failed to fundamentally deter corruption. A weak impact of globalization can result from a lack of active efforts for globalization within a country (a lack of national leadership and commitment). Globalization efforts triggered by international organizations might not reflect a contextual understanding of individual countries. Economy blocs or regions (e.g., Europe, North America, South America, East Asia, the Middle East, and Africa) have both substantial similarities and disparities in terms of corruption, its correlates, and its cultural contexts. Neighboring countries in proximity might easily experience positive external spillover effects of policy learning, policy transfer, and policy diffusion. For example, some countries are more susceptible to corruption due to *resource curse* (natural resource-rich countries might get poorer and more corrupt due to resource rents and a lack of resource control) than others within the same region, even though they share many similar conditions (Kolstad & Wiig, 2009; Kolstad, Wiig, & Williams, 2009; Mehlum, Moene, & Torvik, 2006; Robinson, Torvik, & Verdier, 2006). The former could learn from the latter because the between-country differences, which can be a fundamental reason for corruption, could provide a key solution to corruption. In this way, global regulations in general can have less of an impact on domestic corruption than regionally-based pressure. Overall, cultural moderation should be considered in a more complex way: consideration of both cross-cultural distinction and within-culture variation in terms of the anti-corruption effects of e-government and political-economic capacities.

### 5.3. Limitations and directions of research

This empirical analysis has the following weaknesses. The number of countries in the cultural dimension data is fewer than that of countries in other global indicators. This reduces the number of countries in the empirical analysis by almost one-third of the countries. However, the overall pattern identified in the analysis would not change much even in the larger pool because differences between sampled and non-sampled countries are not systematic.

The number of countries (sample size) that this study covers may not be sufficient for SEM-based estimation. An ad hoc rule of thumb (10 observations per indicators) was used for the number of observations in this study because nine indicators require 90 countries at least (Barclay, Higgins, & Thompson, 1995; Chin & Newsted, 1999; Kahai & Cooper, 2003). Westland's (2010) systematic approach to determining lower bounds of sample size in SEM suggested a more rigorous requirement based on the ratio of indicators to latent variables. He raised a systematic bias issue of SEM-based estimation in empirical studies focusing on insufficient samples. However, this path analysis specified the relationships between measured variables, not considering latent variables, and thus cannot use Westland's (2010) criteria. Nevertheless, it is difficult to say that this cross-country study with limitations of the original data sources is based on the number of countries so as to warrant credibility of research findings.

The study includes a set of theoretically-supported variables, but contexts of corruption vary from country to country. A piece of anecdotal evidence might not have important implications, but a collection of anecdotal cases could contribute to identifying an overall pattern and categorizing the types of country-level corruption. In future research, the overview of this cross-national quantitative examination should be augmented with contextual findings from various practices.

The study does not focus on other possible contextual categories



such as religion. Including more diverse interactions could help investigate within-culture and cross-cultural differences. However, it is difficult to theoretically model the complicated relationships of all possible interactions among political, economic, and cultural contributors of country-level corruption. Rather, this study sheds light on the critical impact of e-government on corruption control with consideration of political, economic, and cultural factors. Future empirical studies should explore country-level corruption as a political, economic, and cultural mix in domestic, regional, and global environments.

## 6. Conclusion

Considering political, economic, and cultural dimensions, this study examines the influence of e-government maturity on corruption control and the moderating effect of cultural types on that influence. It is self-evident that political-economic capacities produce a significant impact on corruption control. The path analysis found that the anti-corruption effect of e-government significantly decreases in cultures where individuals perceive an unequal distribution of power (high power distance) and are uncomfortable with uncertainty and ambiguity (high uncertainty avoidance). While political, economic, and cultural components overall produce basic conditions of country-level corruption, e-government has potential as a strategically effective initiative for anti-corruption in cultures less favorable for corrupt behaviors. This finding relieves a certain extent of corruption determinism, but the expected impact of e-government might remain limited to certain countries under certain political, economic, and cultural conditions.

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