
E-government and corruption control: the mediating effect of law enforcement

Abdallah Alsaad

Department of MIS,
College of Business Administration,
University of Hafr Al-Batin,
P.O. Box 1803, Hafr Al Batin, 31991, Saudi Arabia
Email: aasaad@uhb.edu.sa
and
Department of Business Administration,
Faculty of Economics and Business,
Jadara University,
P.O. Box 733, Irbid, 21110, Jordan
Email: alsaad@jadara.edu.jo

Abstract: While the role of e-government in reducing corruption level is well discussed in the literature, less attention has been given to how e-government combats corruption. This study revisits the association between e-government and corruption and contributes to the existing literature by elucidating how law enforcement mediates this association. The author conducts a cross-nation analysis of 120 countries over four years. The result of panel analysis with random effect models indicates that law enforcement does mediate the association between e-government and corruption. The result shows that e-government will have no strong effect on corruption without first affecting the enforcement of the law. E-government by automating the laws and regulations helps to achieve higher possible levels of compliance to laws and regulations, and that controls improper influence by public officials. Policymakers should consider law and regulations enforcement when design e-government systems in order to control the improper influence by public officials.

Keywords: e-government; electronic government; corruption; mediation; panel analysis; law enforcement.

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Biographical notes: Abdallah Alsaad is an Assistant Professor of Business Administration and a Faculty Associate at University of Hafr Al-Batin, Jadara university. He holds an undergraduate degree in MIS from Al-balqa University, a Master's degree in MIS from Yarmouk University, and a PhD in e-Business from University Utara Malaysia. His teaching and research interests are in the area of business administration and management information systems. His current research involves end user computing, cyberloafing, and adoption of information technology. He has published many referred articles in journals such as *Journal of Information Technology*, *Computers in Human Behavior* and *Telematics and Informatics*.

1 Introduction

E-government has largely been advocated as a new approach to fighting governmental corruption. E-government is argued to curbing corruption in at least two ways. First, it offers a platform for information about governmental actions which increases transparency and accountability of governments in front of the public. Second, it offers monitoring and controlling mechanisms that reduce the potential for corrupt behaviours by government employees (Elbahnasawy, 2014; Krishnan et al., 2013; Srivastava et al., 2016). Having these attributes in mind, many nations with anti-corruption initiatives have directly connected the implementation of these initiatives to the implementation of e-government. For instance, the tax system and department in Pakistan were totally digitalised with the specific intention of decreasing direct interaction between citizens and tax public servants in order to minimise opportunities for corrupt behaviours (Andersen, 2009). Similarly, the land department in Karnataka, India, was electronically transformed in order to monitor land titles transfers and remove opportunities for accepting bribes by public servants as had previously been widespread.

Even though e-government has been suggested as an anti-corruption mechanism, empirical research produces contradictory findings of the effect of e-government on corruption (Andersen, 2009; Elbahnasawy, 2014; Krishnan et al., 2013; Srivastava et al., 2016). Some empirical works reported that e-government has no effect, or even significantly increases corruption (Heeks, 1998). Most of the prior research has directly inspected the salient role of e-government on general national corruptions such as legal, media, and political corruption, though less attention has been given to how e-government reduces corruption. Krishnan et al. (2013) maintained that the impact of e-government on outcomes should be investigated through intermediate impact variables. Despite a growing number of endeavours debating the impact of e-government on corruption, there is relatively little research on how e-government affects corruption through law enforcement. This effect while frequently discussed, it is inadequately researched in empirical works.

This study suggests that e-government, no matter how large it developed in a country, will have no drastic effect on corruption without first affecting the enforcement of the law. However, laws enforcement is one of the most influential anti-corruption approaches used by the government. When laws and regulations are effectively and fairly enforced and implemented without improper influence by private interests, they can secure, protect, and control the economic, environmental, and social objectives of governments (Monk, 2012). We suggest that e-government has to do the following things in order to ensure efficiency and effectiveness improvements in laws enforcement. First, laws and regulations, through e-government, will typically be transformed entirely or partially into programming code and will be managed by automatic processes. As laws and regulations that were hitherto implemented by public officials are enforced by computers, the deficiencies inherent in human systems are often removed in the more rigid world of computers rules (Monk, 2012). This implies that laws and regulations will be effectively enforced without improper influence by public officials and that decreased the discretion of public officials over implementing rules and regulations. In other words, e-government would help to achieve higher possible levels of compliance to laws and regulations, while

controlling improper influence by public officials. Second, e-government enhances the governmental inspection processes which are essential regulatory enforcement activities. As e-government offers comprehensive and integrated information about governmental services and activities, regulatory enforcement agencies including inspection have high opportunities to identify corrupted behaviours by public officials and thus reduce the probability that corruption occurs. Accordingly, we hypothesise that:

- 1 e-government will lead to more law enforcement
- 2 e-government will reduce corruption through law enforcement.

2 Empirical specifications

To examine the suggested relationships, the author relied on large cross-national panel data which consists of 126 countries and for the period 2008–2016. This study estimates the suggested hypotheses using a random effects model which is mostly used in longitudinal corruption research (Elbahnasawy, 2014; Elbahnasawy and Revier, 2012). The random effects model is more efficient than the fixed effects model when countries in the sample are large and years are limited. Using the fixed effects model in such case entails several issues, including the concern of multicollinearity problem among explanatory variables due to the inclusion of many country dummies particularly when countries in the sample are large (Judge et al., 1988). This study estimates the following random effects models to estimate the effect of e-government on both law enforcement and corruption. All explanatory variables were lagged by two years to account for response time in the variables' effects.

$$LAWENF_{i,t} = \alpha_{i,t-2} + EGOV_{i,t} + X_{i,t-2} + u_{i,t-2}$$

$$CCI_{i,t} = \alpha_{i,t-2} + LAWENF_{i,t-2} + X_{i,t-2} + u_{i,t-2}$$

where $LAWENF_{i,t}$ refers to law enforcement for country i at time t , $EGOV_{i,t-2}$ refers to e-government development for country i at time $t - 2$, $CCI_{i,t}$ refers to corruption level for country i at time t , α_i ($i = 1 \dots n$) is the unknown intercept for each country, u_i is the error term, $X_{i,t-2}$ is the vector of explanatory variables for country i at time $t - 2$.

In X_i , the author adds a set of control variables that largely affect both corruption and law enforcement. Prior research indicates that the corruption level in a country is highly associated with GDP per capita, openness, inflation and press freedom (Andersen, 2009; Elbahnasawy, 2014; Elbahnasawy and Revier, 2012). Countries with high GDP per capita are able to assign more resources to control and prevent corruption. Therefore, we include the logged value of GDP per capita ($LOGGDP$) (Andersen, 2009). Similarly, prior research indicates that more openness to international trade critically reduce corruption because it rises market competition and reduces the monopoly power of domestic producers which entail discouragement of rent-seeking behaviours of corrupted officials. In line with Elbahnasawy and Revier (2012), we measure openness by the share of imports in GDP ($IMPORTGDP$). Another important variable affecting corruption level is that inflation ($INFLATION$). Inflation increases the difficulty in monitoring public

contracts and government spending, which leads to higher corruption (Elbahnasawy, 2014; Elbahnasawy and Revier, 2012). Finally, press freedom is a significant determinant of corruption. Press freedom improves transparency and amplifies the risk and cost of corrupt acts, hence leads to lower corruption (Andersen, 2009; Elbahnasawy, 2014). Therefore, the author controls for the effect of press freedom (*PRESFREE*).

However, even though equations (1) and (2) are robust against bias from omission, they may be subjected to both reverse causality and the correlation between explanatory variables and the error term. For instance, Khan and Krishnan (2019) have recently proclaimed that corruption hinders the development of e-government, indicating that reverse causality would be an issue for our findings. So, to deal with such problems, we adopted instrumental variables (IVs) technique using two-stage least squares (2SLS) (Wooldridge, 2010). We use four years of lagged values of *EGOV* and *LAWENF* as IVs of *EGOV* and *LAWENF*. While these lagged values are imperfect IVs, prior research has often used lagged values when better instruments are absent (Alsaad and Taamneh, 2019; Mithas and Rust, 2016).

3 Empirical data

Prior research indicated that the societal impact of information technology including e-government does not occur instantaneously but rather takes place and materialises in a society over time (Alsaad and Taamneh, 2019). Accordingly, the effect of e-government on corruption should be longitudinally assessed (Andersen, 2009). Cross-national panel dataset is largely used in both e-government and corruption types of research as it increases the generalisability of the results and reduces the threat of common method bias (Krishnan et al., 2013). The author utilises a large panel dataset consisting of 126 countries and five years including 2008, 2010, 2012, 2014, and 2016 to examine the suggested hypotheses. The United Nations E-government Development Database provides biannual data about e-government development worldwide which the author used to measure *EGOV*. The index for each country ranges from 0 (low) to 100 (high). The author utilises data on other covariates across all of the years mentioned above in order to have consistent panel data analysis.

In this study, the author utilises the well-known control of corruption index (CCI) accumulated by Kraay et al. (2010) to measure the corruption level. The CCI indicator measures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture by elites and private interests (Kaufmann et al., 2011). The indicator for each country ranges from approximately -2.5 (weak) to 2.5 (strong). Similarly, data about law enforcement was taken from law enforcement index collected by Kaufmann et al. (2011). Data about the inflation rate, GDP and the share of imports in GDP were taken from the World Bank (2016) database. Finally, the author measures press freedom (*PRESFREE*) using the index of press freedom by Freedom House (2016) which ranges between zero (full press freedom) and 100 (no freedom). The descriptive statistics are presented in Table 1.

Table 1 Descriptive statistics

<i>Variable</i>	<i>Mean</i>	<i>Std. err.</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
<i>EGOV (1)</i>	0.500	0.009	1.000						
<i>CCI (2)</i>	0.091	0.048	0.786	1.000					
<i>IMPORTGDP (3)</i>	48.781	1.256	0.162	0.241	1.000				
<i>LAWENF (4)</i>	0.099	0.046	0.828	0.953	0.240	1.000			
<i>INFLATION (5)</i>	5.770	0.288	-0.341	-0.318	-0.043	-0.349	1.000		
<i>PRESFREE (6)</i>	60.148	1.320	0.348	0.388	0.128	0.414	-0.064	1.000	
<i>GDP (7)</i>	385,000,000,000	46,500,000,000	0.295	0.214	-0.236	0.219	-0.154	0.077	1

4 Empirical results

Because the suggested models include control variables, the author estimated four models for each equation in order to examine the true impact of *EGOV* and *LAWENF*. For each equation, the author first estimates the exploratory factor and then the author adds the control variables one by one in the other models. Table 2 shows the results of the random effect estimation of equation (1) and equation (2). The results indicate that *EGOV* is consistently a significant predictor of *LAWENF* and robust against the inclusion of other covariates. Surprisingly, the result also reveals that among all of the control variables only *LOGGDP* significantly affects *LAWENF*. One possible explanation is that openness and press free only contribute to law enforcement when supplemented by other institutional reforms (Andersen, 2009).

Table 2 The results of the random effect estimation of equation (1) and equation (2)

<i>Dependent variable</i>	<i>Covariates</i>	<i>Model (1) coefficient (SE)</i>	<i>Model (2) coefficient (SE)</i>	<i>Model (3) coefficient (SE)</i>	<i>Model (4) coefficient (SE)</i>	<i>Model (5) coefficient (SE)</i>
<i>LAWENF</i>	<i>EGOV</i>	.827*** (.119)	.498*** (.119)	.493*** (.122)	.497*** (.127)	.543*** .125
	<i>LOGGDP</i>		.171*** (.022)	.174*** (.0240)	.181*** (.024)	.186*** .025
	<i>IMPORTGDP</i>			.00 (.00)	.00 (.00)	.00 (.00)
	<i>PRESFREE</i>				.00 (.00)	.00 (.00)
	<i>INFLATION</i>					.00 (.001)
	<i>_cons</i>	-.336*** (.082)	-4.42*** (.556)	-4.51*** (.593)	-4.72*** (.602)	-4.95*** (.622)
	R-square	0.7116	0.323	0.334	0.334	0.407
<i>CCI</i>	<i>LAWENF</i>	.837*** (0.033)	.842*** (0.033)	.833*** (.033)	.832*** (.033)	.836*** (.0355)
	<i>EGOV</i>	.266** (.122)	.291*** (.128)	.271** (.131)	.290** (.133)	.253* (.136)
	<i>LOGGDP</i>		-.010 (.015)	-.001 (.017)	-.004 (.0176)	-.001 (.0181)
	<i>IMPORTGDP</i>			.001 (.000)	.001 (.000)	.001 (.000)
	<i>PRESFREE</i>				.000 (.001)	.000 (.000)
	<i>INFLATION</i>					.000 (.000)
	<i>_cons</i>	-.130 (.066)	.112 (.380)	-.122*** (.436)	-.122*** (.436)	-.187*** (.001)
R-square	0.921	0.922	0.920	0.920	0.920	

The results also reveal that *EGOV* and *LAWENF* are consistently significant predictors of *CCI* and robust against the inclusion of other covariates. Contrary to the expectations, the result reveals that none of the controls significantly affects *CCI*. This result is in line with Andersen (2009) who found that press freedom does not affect *CCI*. Andersen (2009) suggests that covariates may interact with other institutional reforms to reduce corruption.

Table 3 shows the estimation 2SLS. The results provide support for the results from our earlier random effect estimations of equation (1) and equation (2) when IVs are used in 2SLS. This suggests that the findings of this study are robust against endogeneity problems.

Table 3 2SLS parameter estimates

<i>Parameters</i>	<i>Coef.</i>	<i>Std. err.</i>	<i>z</i>	<i>P > z</i>
<i>EGOV -> CCI</i>	0.511	0.308	1.660	0.097
<i>LAWENF -> CCI</i>	0.892	0.055	16.330	0.000
<i>EGOV -> LAWENF</i>	1.080	0.218	4.960	0.000

To test for the mediation effect of *LAWENF*, the author relied on Preacher and Hayes's (2008) bootstrapping strategy to estimate the indirect effect between *EGOV* and *CCI* through *LAWENF*. The result of the estimation is provided in Table 4 and indicates that the confidential intervals do not include zero, suggesting that *LAWENF* does mediate the relationship between *EGOV* and *CCI*.

Table 4 2SLS parameter estimates

	<i>Observed coef.</i>	<i>Bias</i>	<i>Bootstrap std. err.</i>	<i>[95% conf. interval]</i>	
Indirect effect (<i>EGOV -> LAWENF -> CCI</i>)	4.01588	-0.003	0.156	3.704	4.307

5 Discussion and conclusions remarks

The role of e-government in affecting corruption level is well discussed in the e-government literature. Nevertheless, less attention has been given to how e-government combats corruption. This study revisits the association between e-government and corruption by explicating how law enforcement mediates the influence of e-government on corruption level. Panel analyses based on large cross-national dataset largely support the proposed model. The results confirm that e-government, no matter how large it developed in a country, will have no drastic effect on corruption without first affecting the enforcement of the laws. As laws and regulations are computerised in e-government systems, e-government helps to achieve higher possible levels of compliance to laws and regulations, while controlling improper influence by public officials. Therefore, this study offers a systematic clarification of the mechanism controlling corruption within nations. This study offers several implications for policymakers. It helps public administrators and policymakers to better understand how e-government leads to corruption reduction in a nation. Policymakers should keep in their mind how to enforce the law and control the improper influence by public officials when design e-government systems.

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