Research on the Relationship between E-government, Fiscal Transparency and Government Corruption: Evidence from Random Effects Model

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Abstract—Fiscal transparency and government corruption are key issues of concern among governments and citizens worldwide. E-government arose from modern information and communication technology, which provides new means and new ideas for strengthening fiscal transparency and weakening government corruption. In order to verify the actual role of e-government, this paper conducts empirical research using data from 42 countries over the period of 2001 to 2015. The results of the random effects model indicate that the development of e-government strengthened fiscal transparency and weakened government corruption. The conclusion of this paper shows that e-government has a promoting effect on public management.

Keywords- e-government; fiscal transparency; government corruption

1. Introduction

E-government is used by government bodies to reorganize and optimize their organizational structures and working processes by adopting modern information technology in their administration and service functions. There is no doubt that e-government plays an important role in today's socioeconomic life. However, due to the rapid development and implementation of e-government, we cannot ignore the problems associated with it. For example, e-government can be an "investment black hole" in many developing countries and scholars have doubts about its actual role and effect. In light of these issues, can existing cases and data demonstrate that the construction of e-government has decreased the degree of government corruption and increased the degree of government fiscal transparency? This study seeks to answer this question using transnational data to analyze the economic consequences of e-government. Panel data analysis and the results of the random effects model show that e-government has significant impacts on fiscal transparency and government corruption.

2. Literature Review and Research Hypotheses

Since the emergence of e-government, some scholars still have doubts about its actual role. Åkesson et al. (2008) [1] argued that the role played by e-government in practice is quite different from theoretical expectations. Jain (2002) [2] found that the implementation of e-

government has not significantly weakened government corruption. Conversely, Ho (2002) [3] and Criado and Ramilo (2003) [4] had a positive assessment of e-government. They considered it to be a good example of the successful transformation of public organizations, which would have a profound effect on public administration in terms of technology application, cost-benefit and risk evaluations, and public welfare. Shim and Eom (2008) [5] used national-level data to study the impact of e-government on corruption. They found that e-government had a consistently positive impact on reducing the number of corrupt activities. Zhao and Xu (2015) [6] reviewed previous studies on e-government and corruption at the national level and established an aggregative model to analyze the relationship between e-government and corruption. Their results show that the development of e-government was related to a lower degree of government corruption. Related research also points out that the effectiveness of digitalization depends on the interaction of personal and organizational skills [7]. Finally, existing literature points out that e-government can promote the development of national economy [8].

In a country, the government is not only the holder of a large amount of public information, but also the legislator. Under the traditional administration system, the formulating of public policies and provision of public services are not open to the public. Rather, these processes are controlled by a few people. The public and the government are in a position of information asymmetry, which means that government information is often known to and used by a few people or some interest groups while the public received comparatively little information that is related to its own interests. As a result, it is difficult for the public to protect its own legal interests and it is impossible to guarantee social fairness and participation in the deliberation and administration of state affairs. The advent of the information society and wide use of information technology have significantly reduced the cost for information exchange and travel. People have more means for accessing information and it becomes more difficult for the government to maintain a monopoly on information. Furthermore, the government loses the reason for engaging in non-public administration. The openness and transparency of public administration have evolved into an inevitable trend. The emergence of e-government has greatly enhanced the transparency, and its basic function is to provide the government with an information release platform that should be an effective, fast and convenient carrier for the disclosure of government information. It enables the government to make an announcement on the Internet to explain its policies, regulations, and main activities to the public. Specifically, before making a material decision, the government can first solicit citizens' opinions and suggestions online, so that the public can participate in the discussion. Consequently, the decision can be more consistent with public interests and needs.

E-government can improve citizens' ability to obtain and process information, reduce the cost of participation and expression, and create conditions for the public to participate in public affairs. In addition, e-government also places government administration under the common supervision of all social members and organizations, which greatly limits the space for black case work and reduces the possibility of power abuse. This maximizes the openness and fairness of government administration and protects the public's interests. In this regard, this paper proposes the following two hypotheses:

Hypothesis 1: The higher the development level of e-government in a country, the higher the degree of transparency of government finances.

Hypothesis 2: The higher the development level of e-government in a country, the lower the degree of its government corruption.

3. Research Design

3.1 Model Design

This paper uses the model below to study the impact of the development level of e-government on fiscal transparency.

$$OBI = \beta_0 + \beta_1 EGDI + \beta_2 Growth + \beta_3 IEF + \beta_4 REV + \beta_5 CPI + \varepsilon \tag{1}$$

Further, it uses the second model presented below to study the impact of the development level of e-government on government corruption.

$$CPI = \beta_0 + \beta_1 EGDI + \beta_2 Growth + \beta_3 FRE + \beta_4 REV + \beta_5 IEF + \beta_6 EXP + \varepsilon \tag{2}$$

The United Nations uses the E-government Development Index (EGDI) to measure the level of e-government development in various countries, which is the weighted average of standardized scores of the top three aspects of e-government. These are the scope and quality of online services (Online Service Index, OSI), the development of telecommunications infrastructure (Telecommunications Infrastructure Index, TII), and the inherent human capital (Human Capital Index, HCI). The higher EGDI, the higher the level of e-government development in a country.

3.2 Variable Selection and Definition

This paper studies the impact of the development level of e-government on government corruption and fiscal transparency. As such, the degree of fiscal transparency and the degree of government corruption are the explained variables. The degree of government corruption in the Transparency International was scored from 0 to 10, with a higher score representing lower government corruption. However, for the intuitiveness and the visualization of the results, the data was transformed by taking the absolute value of the original value minus 10. After this modification, a higher score represents a more corrupt government.

Since the two explained variables involve different economic consequences, this paper selected different control variables when examining each of the two factors. When studying the impact of the development level of e-government on fiscal transparency, this study included the following control variables: GDP growth rate, economic freedom, government revenue, and degree of government corruption. When the explained variable is the degree of government corruption, the control variables used were: GDP growth rate, government expenditure, government revenue, political freedom, and economic freedom. The definition of each variable is shown in Table 1.

Table 1. Variable Definition

Variable symbol	Variable name	Variable description
OBI	Fiscal transparency	OBI Score
CPI	Degree of government corruption	The higher the score after transformation, the more corrupt the government
EGDI	Level of e-government development	EGDI Score
REV	Government revenue	Proportion of government revenue in GDP
EXP	Government expenditure	Proportion of government expenditure in GDP
Growth	Level of economic growth	GDP growth rate
IEF	Economic freedom	Scores from 0-100, with a higher score representing a higher freedom level
FRE	Political freedom	The higher the score after transformation, the higher the freedom level

3.3 Sample Selection

This study used variables from 42 countries that had no missing data in respect to the factors in Table 1 from 2002 to 2015. The final samples included 15 developed countries such as the United States, the United Kingdom and France, as well as 27 developing countries such as India and China. All continuous variables are subjected to winsorize processing at the 1% and 99% levels in order to avoid the adverse effects of extreme values on the research conclusions.

3.4 Data Sources

The data for the dependent variable fiscal transparency (Open budget index) that was used in this study comes from the International Budget Partnership (IBP). The degree of government corruption used the corruption index issued by Transparency International, while the EGDI and its three specific indicators were obtained from the United Nations E-government Survey. The sources for the control variables are shown in Table 2.

Table 2. Data Resources

Variable symbol	Unit	Data Source
OBI	Score	IBP (International Budget Partnership)
CPI	Score	Transparency International
EGDI	Score	United Nations E-government Survey
REV	Percentage	IMF (International Monetary Fund)

EXP	Percentage	World Bank
Growth	Percentage	World Bank
IEF	Score	Index of Economic Freedom
FRE	Score	Freedom in the World

4. Empirical Results and Analysis

Table 3 shows the descriptive statistics of the sample countries selected in this paper.

Table 3. Descriptive Statistics

Variable	mean	med	max	min	sd
OBI	5.6075	5.8	9.3	0.1	2.1166
CPI	5.4640	6.2	8.7	0.5	2.0107
EGDI	0.5721	0.5650	0.9462	0.1960	0.1741
REV	0.3129	0.3172	0.5740	0.1052	0.1068
EXP	0.3295	0.3308	0.5732	0.1103	0.1079
Growth	0.0367	0.0378	0.3374	-0.1089	0.0349
IEF	5.5272	6	7	1.5	1.5879
FRE	62.1625	62.4982	82.3282	42	8.5415

In order to verify the impact of the development level of e-government on fiscal transparency and government corruption, this paper uses panel data from 44 countries from 2002 to 2015 in a random effects model regression. The table below discloses the results of multiple regression analyses.

Table 4 indicates that development level of e-government has a significant impact on fiscal transparency and that the estimated coefficient of EGDI was significantly positive at the 1% level. It is concluded from this that EGDI has a significant positive relationship with fiscal transparency. In other words, the higher the development level of e-government in a country, the higher the degree of its fiscal transparency.

Table 4. Regression Results of Obi and Cpi

variable	(1)	(2)
	OBI	CPI
EGDI	1.736***	-1.064***
	(0.506)	(0.328)
Growth	-1.096	1.191*
	(0.906)	(0.630)
IEF	0.0199**	-0.0513***
	(0.00964)	(0.00590)

REV	0.429	-5.169***
	(1.102)	(0.776)
CPI	-0.136**	
	(0.0631)	
FRE		-0.241***
		(0.0507)
EXP		1.340*
		(0.687)
Constant	4.029***	11.73***
	(0.981)	(0.477)
N	588	588
Number of countries	42	42

Note: The standard errors are in brackets; ***, ** and * represent significance at the levels of 1%, 5% and 10%, respectively.

Table 4 indicates that EGDI has a negative relationship with government corruption and that the estimated coefficient of EGDI was significantly negative at the 1% level. Thus, the higher the level of e-government in a country, the lower the degree of its government corruption.

5. Robustness Test

Considering the accessibility and completeness of the data, this paper uses the World Governance Indicators (WGI) instead of OBI to test the robustness of the conclusion. The higher the WGI score, the better job a country's government is doing. The results of the robustness test are shown in Table 5.

Table 5. Robustness Test Results

variable	(1)	(2)
	WGI	ICRG
EGDI	1.174**	0.708**
	(0.489)	(0.300)
Growth	3.566***	0.605
	(0.872)	(0.585)
IEF	0.0696***	0.0227***
	(0.00931)	(0.00537)
REV	3.178***	0.770
	(1.080)	(0.696)
CPI	-0.759***	
	(0.0615)	
FRE		0.111**
		(0.0443)
EXP		1.601**
		(0.628)
Constant	-0.481	-0.451
	(0.953)	(0.406)
N	588	574
Number of countries	42	41

Note: The standard errors are in brackets; ***, ** and * represent significance at the levels of 1%, 5% and 10%, respectively.

The results presented in Table 5 support Hypothesis 1 that the higher the development level of e-government in a country, the higher the degree of its fiscal transparency.

This study replaced CPI with the government corruption index in the International Country Risk Guide (ICRG) issued by Political Risk Services (PRS) for the robustness test. The score of this index ranges from 0 to 6, with a higher score representing lower corruption. In this paper, Nepal lacked ICRG data and was excluded from the robustness test. Therefore, 41 sample countries were tested.

A higher score on the government corruption index in the ICRG represents lower government corruption. The coefficient of EGDI is positive and significant at the 5% level. The results of the robustness test support the previous conclusion that the development of a country's e-government is helpful for decreasing the degree of government corruption.

6. Conclusion

This study found that e-government has a significant impact on the levels of government fiscal transparency and corruption. As results indicate, the relationship between EGDI and fiscal transparency and corruption was statistically significant. This indicates that the development of e-government can strengthen fiscal transparency and weaken government corruption. To reduce its corruption, a government must guarantee transparency and openness. The contribution of e-government lies in that modern information technology can effectively reduce the information asymmetry between citizens and the government, strengthen real-time supervision, promote the openness of government affairs, reduce the level of government corruption, and further strengthen the government's credibility. However, it will likely take a long time before achieving these goals in China. Without substantive reform, the more likely scenario is that e-government will only focus on the metaphysical "electronic technology" level, while no substantial progress is made toward achieving a "transparent government" system.

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