

Does Better E-government Increase Transparency? An Empirical Study of E-government and Corruption

Jennifer Hill

Master of Science, Development Management, Candidate
School of International Service

Abstract

Increasingly, the role of public administration and governance is seen as a key factor in a country's human and economic development, a role that is undermined by the presence of corruption. Thus it is critical to evaluate tools and programs to fight corruption so that the most promising methods can receive additional resources and attention. This study contributes to the understanding of e-government and corruption by examining the relationship between e-government achievement and transparency, as measured by the Corruption Perceptions Index. The UN E-government Index and the Global E-government Index are used to analyze e-government achievement. Using a pretest-posttest design, the study finds a significant and positive relationship between a country's e-government achievement and its transparency score. This paper provides a vote of confidence for the use of information and communication technologies in combating corruption and calls for continued efforts in benchmarking and evaluating e-government.

Introduction

Speaking at the launch of the Corruption Perceptions Index 2003 (CPI), Peter Eigen, Chairman of Transparency International (TI), stated, "nine out of ten developing countries score less than 5 against a clean score of ten in the TI CPI 2003. Their governments must implement results-oriented programs to fight corruption, but they also urgently require practical help tailored to the needs of their national anti-corruption strategies" (Transparency International, 2003b). But TI's corruption rankings reveal that corruption does not thrive only in developing countries; it is found even in the world's richest countries.

Increasingly, the role of public administration and governance is seen as a key factor in a country's human and economic development. Corruption is a pervasive problem and presents a major threat to economic and social development. Thus it is critical to evaluate tools and programs to fight corruption, so that the most promising methods can receive additional resources and attention. This paper contributes to the understanding of e-government and corruption by examining the relationship between e-government achievement and transparency, as measured by the Corruption Perceptions Index. The study finds a significant and positive relationship between a country's e-government achievement and its transparency score, though these results are limited by the availability of the corruption index for some countries and the few years of data available for e-government achievement. The study should be viewed as part of a larger context of considering the relative value and impact of the transformative power of information and communication technologies (ICTs).

Current State of E-government

The last 10 years have witnessed explosive growth of the Internet, from e-mail to e-commerce to e-government. In 1996, fewer than 50 official government homepages could be found on the Web. By 2001, 169 of the 190 United Nations (UN) member states were providing some degree of information and services online. In that year it was estimated that there were well over 50,000 official government websites – 22,000 sites in the U.S. federal government alone, (Ronaghan, 2002). The World Bank defines e-government as "the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government" (World Bank, para. 1). These technologies can serve a variety of functions: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can include less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions. In this paper, the concept

of e-governm
information a

Sever
government.
Index to anal
International
of a study co
websites for
service deliv
approach, an
as comparing
included in t

Research H

Prop
transparency
difficult for
hypothesis t
capacity/per
transparency

Tran
Perceptions
and in gener
the public s
A country's
least three s
in compilin
private ben
procurement
as seen by
corrupt) to
highest was

Research I

Thi
is a pretest
is the coun

of e-government will be limited to the use of the Internet for delivering government information and services to citizens.

Several attempts have been made to quantify countries' efforts towards e-government. This study uses the UN E-government Index and the Global E-government Index to analyze the impact of e-government on corruption, as measured by Transparency International's Corruption Perceptions Index. The Global E-government Index, the result of a study commissioned by the World Markets Research Center, evaluates government websites for the presence of various features dealing with information availability, service delivery and public access. The UN E-government Index takes a more holistic approach, analyzing the content and services provided by government websites as well as comparing the ICT infrastructure and human capital capacity for UN member states included in the index.

Research Hypothesis

Proponents of e-government claim that one of its benefits is increased transparency, making it easier for citizens to monitor their government and thus more difficult for governments to engage in corrupt practices. This study will test the hypothesis that increases in a country's e-government index (representing e-government capacity/performance) over time will have a significant and positive effect on a country's transparency score.

Transparency, the dependent variable, is measured using the Corruption Perceptions Index (CPI) from Transparency International. The CPI dates back to 1995, and in general more countries are added each year. The CPI focuses on corruption in the public sector and defines corruption as the abuse of public office for private gain. A country's performance is assessed using surveys from 13 independent institutions; at least three surveys are required for a country to be included in the CPI. The surveys used in compiling the CPI tend to ask questions in line with the misuse of public power for private benefit, with a focus, for example, on bribe-taking by public officials in public procurement. A country's CPI score relates to perceptions of the degree of corruption as seen by business people, academics and risk analysts. Scores range from 0 (highly corrupt) to 10 (highly clean). In this study's data set, the lowest score was 0.4 and the highest was 9.9.

Research Design

This study takes a quasi-experimental form with statistical controls. The design is a pretest-posttest with multiple comparison groups (countries). The dependent variable is the country's CPI score (transparency score) in the years 2001, 2002 and 2003. The

pretest is the country's CPI for the previous year, e.g. 2000 CPI for the 2001 data.

The independent variable is the e-government index for the corresponding years. Both e-government indices were converted to Z-scores so that they could be analyzed on a standardized scale. Separate linear regression analyses were performed for the two indices, with a combination of different control variables. The following control variables were used: a) year (to control for trend in the Global index and as a dummy variable for the UN index), b) pretest transparency score (to control for a country's initial transparency level), and c) development status (developed, developing or least developed country). Developed countries were defined as those belonging to the Organization for Economic Co-Operation and Development (OECD). Least-developed countries (LDCs) were based on a list compiled by the UN Conference on Trade and Development (UNCTAD). The remaining countries were classified as developing countries. In separate regressions, the pretest score was replaced by country dummies to control for country fixed effects.

The UN E-government Index

In addition to a country's official online presence, the 2001 UN E-government Index considers the conditions necessary to ensure that every segment of the population has access to timely, useful and relevant information and services. Thus the UN E-government Index is a combination of measures: 1) web presence; 2) ICT infrastructure, including indicators such as percentage of population online; and 3) human capital measures, including the Human Development Index and the urban population percentage. In 2003, the index was renamed the E-government Readiness Index and was transformed to a scale of zero to one, with one being the highest E-government Readiness score. The original index allowed scores greater than one. The index was not available for 2002, thus a panel data set was not available for the UN index.

The Global E-government Index

The Global E-government Index, measured on a scale of 0 to 100, is entirely based on a research team's evaluations of a sampling of government websites from each country in the study. Websites were given points for the presence of various features, including contact information, privacy policy, security features, online services, and search capability. The scoring of the index has changed in every year since its inception. In 2001, 28 features were worth up to 88 points. Each site qualified for a bonus of six points if it were linked to a portal site, and another six points might be awarded based on the number of online services executable at the site -- one point for each service up to six points (West, 2001). In 2002, 24 features were worth up to 96 points. Each site could qualify for up to four bonus points for each online service (West, 2002). (This explains the large increase in scores in 2002.) In 2003, 19 features were worth up to 76

points. E
executabl

TH
the globa
and Guin
the numb
with a sc
least tran

Findings

T
on one of
transpare

U
index w
governm
Not surp
compare
likely to
UN Ind
When a
countric
the pret
(Model

points. Each site could qualify for a bonus of 24 points, one point for each online service executable at the website (West, 2003).

The United States was the top country for the UN Index in 2003 and 2001 and for the global index in 2001. Uganda was rated the lowest by the UN in 2001, and Congo and Guinea-Bissau were last in the global index. In terms of transparency, Finland was the number one country in 2001 with a score of 9.9. The United States was ranked 16th with a score of 7.6. Uganda was number 88 with a score of 1.9, and Bangladesh was the least transparent country with a score of 0.4.

Findings

The basic regression model (Model 1) was a linear regression of transparency on one of the e-government indices as the independent variable and the year and pretest transparency score as control variables. The results are recorded in the table below.

Model 1a	B	SE	Beta	Sig.
Constant	73.052	50.168		0.147
Pretest (Transp. t-1)	0.932	0.016	0.922	0.000
Year	-0.036	0.025	-0.015	0.148
UN E-gov Index	0.231	0.039	0.087	0.000

R = .992

R² = .983 N = 166

Model 1b	B	SE	Beta	Sig.
Constant	62.509	50.29		0.215
Pretest (Transp. t-1)	0.999	0.010	0.988	0.000
Year	-0.031	0.025	-0.011	0.215
Global E-gov Index	0.008	0.024	0.00	0.737

R = .990

R² = .981 N = 271

Using the UN E-government Index (Model 1a), both the pretest score and the index were significant at the .001 level. The results show that as a country's UN E-government Index score increases by one unit, its transparency score increases by .213. Not surprisingly, the beta coefficients show that the pretest score is more important (.922 compared to .087 for the index). The R² for this model was .983. Autocorrelation is not likely to be a problem, since only two nonconsecutive years of data were available for the UN Index. The regression yielded identical results when run with robust standard errors. When analyzed as a random-effects model to examine instability in the intercept across countries, all variables were significant; the UN Index coefficient increased to .23, and the pretest score coefficient decreased to .92. Turning to the Global E-government Index (Model 1b), this index was not significant when used as the independent variable in the

same model. Only the pretest score was significant, and the R^2 was .981.

A second regression model also found a statistically significant UN E-government Index. Model 2 was a linear regression on transparency controlling for year, pretest score, and development status of the country. Both the UN E-government Index, with a coefficient of .209, and the pretest score, with a coefficient of .930 were significant at the .001 level. The dummy variables for developing country status and least-developed country status were not significant, most likely because the UN index accounts for characteristics that vary based on a country's development status, such as telecommunications infrastructure, human development, and urbanization. The R^2 for this second model was also .983. The Global E-government Index was once again not significant. However, the dummy variables for country status were significant at the .05 level, as the Global Index does not include country-specific factors. The pretest score was significant at the .001 level, and the R^2 remained at .981. The year variable was not significant in either Model 1 or Model 2.

The final regression model used country dummies in place of the pretest transparency score, which was collinear. Controlling for year and country fixed effects, the UN E-government Index was no longer statistically significant, possibly because there is collinearity between the index and the fixed effects. However, in Model 3 the Global E-government Index was statistically significant and negative at the .10 level. This result indicates that as a country's Global Index increases by one unit, its transparency decreases by .446. This contradicts the hypothesis that there will be a positive relationship between the two. However, there are some major problems with the reliability and validity of the Global Index, as will be discussed further.

All available country data was used in the regressions. If a country did not have transparency data, it was not included in the analysis. The number of observations using the UN E-government Index was 166, while the number of observations for the Global E-government Index was 271. This is because the UN Index was not produced for 2002. In addition, the Global Index included more countries with transparency scores.

Discussion of the E-government Indices

There are a number of reasons to consider the UN E-government Index a more trustworthy indicator for evaluating a country's e-government programs. First of all, the UN is more reputable and has more resources to carry out research and data collection than the team from Brown University that worked on the Global E-government Index. Secondly, the UN Index recognizes that citizen access to technology is a key part of the delivery of e-government services. If citizens do not have access to the Internet, the government's website is not of great use to them. This is another reason that the

UN Index is better for examining e-government impacts specifically on transparency—because it includes measures of technology access and literacy. If most of the society cannot access and utilize the government websites, e-government cannot realistically have an impact on transparency. The validity of the index was further demonstrated through a factor analysis, which extracted only one component when all variables in the index were analyzed using principal component analysis. Each element of the index was roughly of the same importance. Measurement reliability is aided by that fact that most of the index is comprised of administrative data.

Besides the aforementioned reasons for the UN Index's superiority, the Global Index is fraught with inconsistencies. The instrumentation problem was described earlier. In each of its three years, the creators of the index changed how points were awarded. This means the index may not be comparable across years because it is not measuring the same thing. Data was not available to do a factor analysis. Nearly all countries increased their scores in 2002 but decreased significantly in 2003. It is unlikely that the majority of e-government websites got worse over the course of one year, which would indicate problems with face validity. Because it does not use administrative data, the index is less reliable as it is subject to human error. There is also potential selection bias, because the websites analyzed for the Global Index were not randomly selected. In addition, researchers were probably more likely to analyze English websites than those in the countries' native languages.

A bivariate correlation of the two indices yielded an R of .653 and an R^2 of .426, significant at the .01 level. This is a good indication that the indices are not really measuring the same thing, even though they both claim to measure e-government performance. This discussion has shown that the Global Index has problems in terms of measurement validity and reliability. For these reasons, and the fact that the UN Index performs better in the regression analyses, the UN Index is the better index for drawing conclusions about the research hypothesis.

Conclusion

Based on analysis of the UN E-government Index, there is a significant and positive relationship between a country's e-government score and its transparency score. This conclusion is supported by theory about the benefits of e-government. It is also supported in practice, in that a number of development efforts have focused on using Internet technologies to increase transparency in government operations. This study provides a vote of confidence for those involved in such efforts. Nonetheless, it is important to take note of some limitations of this study and some directions for future research.

Limitations of the study

One limitation of the study is that the main variables of interest are measured in terms of perception. The Corruption Perceptions Index measures the perception of corruption, not the actual proven cases of corruption. In addition, it measures the perception of the elites in society, rather than the average citizen. Nevertheless, it is still a highly regarded measure and is probably the best and most comprehensive available source of data at this time. The e-government indices are also based on perceptions—perceptions of what the researchers think are the most important components of e-government. A more comprehensive index would take into account citizen perceptions as well. But again, e-government is an emerging field of study, and there are not many indices available, especially ones that include developing countries.

Because some country data is missing, there might be issues with external validity. In particular, at least six Middle Eastern countries are missing transparency data for 2001 and 2002. This means the results are only generalizable to the countries that had transparency data for the years being studied. These countries could conceivably be different from countries that do not have transparency data.

There could be concerns about the hypothesis test as well. The N is somewhat small; increasing it would reduce the probability of Type 1 and Type 2 error. Unfortunately, the study is limited by the availability of the dependent variable, transparency, and the lack of more years of data for e-government achievement. Despite these limitations, there is good reason for optimism about the prospects for e-government and increased transparency.

Directions for future research

E-government is one potential component of strategies that aim to fight corruption; however, e-government has many other potential benefits. One direction for further research is to examine transparency along with other benefits of e-government, such as cost-savings, social inclusion, citizen participation and improved service delivery, to determine where e-government makes the biggest impact.

Benchmarking e-government is a recent phenomenon. In general, the first comprehensive work on e-government indices began in 2001. As more time series data becomes available in the coming years, it will be possible to do more robust studies about the effects of improvements in e-government. Benchmarks and indices for e-government are continuing to evolve. The UN is leading the way with its 2003 study, which highlights the importance e-democracy and e-participation measures. Ultimately, an e-government index should consider e-government's ability to address major sources of

SOURCES

OECD. *Ratifica*
<http://www.oecd.org/dataoecd/1/00/html>

Ronaghan, Step
UNDP
governm

Transparency In
Percepti
[transpar](#)

Transparency In
Retrieve
[archive/](#)

UN. (2003). *Wo*
Retrieve
[docume](#)

UNCTAD. *Stat*
[r0.uncta](#)

West, Darrell. ()
from [htt](#)

West, Darrell. ()
from [htt](#)

West, Darrell. ()
from [htt](#)

World Bank. *A*
[www1.](#)

"unfreedom," by expanding political participation, health care, education, gender equity and economic prospects (UN, 2003, p. 7)

SOURCES

- OECD. *Ratification of the Convention on the OECD*. Retrieved December 1, 2003, from http://www.oecd.org/document/58/0,2340,en_2649_201185_1889402_1_1_1_1,00.html.
- Ronaghan, Stephen A. (May 2002). *Benchmarking E-Government: A Global Perspective*. UNDPEPA. Retrieved December 1, 2003, from <http://www.unpan.org/e-government/Benchmarking%20E-gov%202001.pdf>.
- Transparency International. (2003a). *Frequently asked Questions about the TI Corruption Perceptions Index (CPI) 2003*. Retrieved December 1, 2003, from http://www.transparency.org/cpi/2003/cpi2003_faq.en.html.
- Transparency International. (2003b). *Corruption Perceptions Index 2003 Press Release*. Retrieved December 1, 2003, from <http://www.transparency.org/pressreleases/archive/2003/2003.10.07.cpi.en.html>.
- UN. (2003). *World Public Sector Report 2003: E-government at the Crossroads*. Retrieved December 1, 2003, from <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan012733.pdf>.
- UNCTAD. *Statistical Profiles of LDCs, 2001*. Retrieved December 1, 2003, from <http://r0.unctad.org/en/pub/ldcprofiles2001.en.htm>.
- West, Darrell. (2001). *Global E-Government Survey 2001*. Retrieved December 1, 2003, from <http://www.insidepolitics.org/egovt01int.html>.
- West, Darrell. (2002). *Global E-Government Survey 2002*. Retrieved December 1, 2003, from <http://www.insidepolitics.org/egovt02int.pdf>.
- West, Darrell. (2003). *Global E-Government Survey 2003*. Retrieved December 1, 2003, from <http://www.insidepolitics.org/egovt03int.pdf>.
- World Bank. *A Definition of E*Government*. Retrieved December 1, 2003, from <http://www1.worldbank.org/publicsector/egov/definition.htm>.