

# Impact of Information Technology on Financial and Bureaucratic Corruption in Developed and Developing Countries

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**Abstract-** Economic and financial corruption in the today's world especially in developing countries has been proposed as one of the most important factors in the development of society and has been created irreparable damage on the speed of the wheels of society. The economic corruption problem would not be solved, unless to identify and to eradicate its factors and the roots of this phenomenon. The main objective of this article is to survey the effect of information technology on financial and bureaucratic corruption in developed and developing countries. The research method used in this study was research library based on data, international data and using econometric methods. Panel data model was used to test the research hypotheses. Summary and conclusions of hypotheses show that the degree of openness of economy and the number of internet users have a positive and significant impact on corruption, i.e. the corruption has been increased by the increasing of the number of internet users and the increasing of the degree of openness in the countries studied and the variable of information technology expenses not related to corruption.

**Keywords-** financial and bureaucratic corruption, information technology, panel data

## I. INTRODUCTION

Economic corruption has been become a major problem in developed and developing countries; some believe that there is no way to solve this problem basically. Some believe that the penalties and punishment of perpetrators of corruption is the only way to deal with the problems of corruption. The economic corruption problem would not be solved, unless identify and eradicate its factors and the roots of this phenomenon. The complex nature of corruption are convinced most observers that there is no immediate and determined solution to treatment the phenomenon.

## II. RESEARCH LITERATURE

Financial and bureaucratic corruption is historical, big, impressive phenomenon and the focus of thinking and policy (Fazeli, 1388). Today's, the Financial and bureaucratic corruption become to a global problem; governments are aware that corruption is causing many injuries and do not know any

boundaries so that its results and outcomes are varied based on the type of the political and economic organization and level of development. This phenomenon in today's world and particularly in developing countries has been proposed as one of the most important factors in the development of society and creates irreparable damage on the speed of the wheels of society development. Unfortunately, the current study shows that the corruption phenomenon appears all over in the poor and developing countries. One of the techniques that has been considered in recent years to control and reducing of corruption in the public administration is E-government. There is expected of information technology and communication (ICT) that be increasing the transparency of administrative processes and decision making and since the implementation of control and monitoring of corruption is along with much user and informational activity, they need to increase the required utilities and IT for managers to rely on them to control corruption. (Alavi Shad, 1384). Sharifi (1391), in a paper entitled "*The role of information technology in reducing of bureaucratic corruption through increasing of information transparency, improvement of accountability and promotion of trust*" investigate the role of information technology to reduce bureaucratic corruption in Saderat bank-Isfahan branches. The inferential statistic, Pearson correlation coefficient and multiple regressions was used to test of hypothesis. The results of the study showed that transparency of information, improvement of accountability and promotion of trust and accuracy due to information technology including phone and fax, computer and E-banking services have direct and significant relationship with the reduction of bureaucratic corruption. Iranzade (1391), in the study entitled "*study of the relationship between E-government and health bureaucracy*" investigates the relationship of e-government on health bureaucracy. The statistical population of the study was municipal of the south in West Azarbayjan province. The data collection tool for e-government was Torres, Pina and Roywood standardized inventory and for the healthy bureaucracy, the standardized questionnaire of PhD Gharzavi has been used. In order to analyze the data in this study, the test of Kolmogorov- Smirnov and Spearman correlation test was used and concluded that the information technology not only has no significant effect on the management of corruption, but in some cases creates new opportunities for corruption. Thus, to use information technology as a tool to fight to corruption, other factors should

also be considered. Qi Liu (2010), in the research based on dynamic panel data model, investigates the role of the internet in reducing of corruption. The results showed that the internet has a significant effect in reducing of corruption, but not drastic. The experimental results show the potential of the internet in reducing of corruption. Anderson (2009), in his paper, using a panel model included of 149 countries with two observations in 1996 and 2006s estimates the impact of e-government on the corruption control index. The first results of estimation showed a positive and interesting effect in view point of economic with the most conservative estimates and move from the 10th percentile to the 90th percentile in the distribution of electronic government implies a reduction of corruption was equal to move from the 10th percentile to 23 percentile of the distribution of control of corruption. The experimental results and statistical analysis showed that the effect of e-government in reducing of corruption.

### III. RESEARCH HYPOTHESES

#### A. The main hypothesis:

- The use of IT and its expanding has significant effect on economic corruption.

#### B. Subsidiary hypotheses:

- The numbers of internet users have significant effect on economic corruption.
- IT spending of Government has significant effect on economic corruption.
- The degree of openness of economy has significant effect on economic corruption.

#### C. Research Model

This research model is as follows:

$$(CPI)_{it} = \alpha_0 + \alpha_1(OP)_{it} + \alpha_2(ITS)_{it} + \alpha_3(INTU)_{it} + C$$

Where

$(CPI)_{it}$ : corruption perception index in country  $i$ th at  $t$  time

$(OP)_{it}$ : degree of openness of economy in the country  $i$ th at  $t$  time

$(ITS)_{it}$ : IT spending of government in the country  $i$ th at  $t$  time

$(INTU)_{it}$ : number of internet users in the country  $i$ th at  $t$  time

### IV. DESCRIPTION OF VARIABLES

#### A. Corruption Perception Index (CPI)

This index ranks the countries based on the level of perception of corruption among government administration and politicians. According to the CPI, top countries with the least corruption among politicians take a score of 10 and most corrupt countries in the intermediate government system take a score of zero. The variable data has been collected from the website of International Transparency.

#### B. The Degree of openness

This index indicates the degree of openness of the country in term of trade. The data of the index have been collected from the Heritage Foundation and expressed as a percentage.

#### C. Information technology spending

This index refers to all of the expenses that the government of each country putting up to expands and development of information technology and communication. The data of this variable has been collected from the World Bank.

#### D. Number internet users

It shows the level of the growth, development and advancement of the internet in each country. Data of the variable has been collected from the World Bank.

#### E. Period and selected countries

The study period was from 1995 to 2010 and the countries studied are: Turkey, Bahrain, Jordan, Kuwait, Lebanon, Iraq, Saudi Arabia, Oman, Iran, UAE, USA, Norway, Canada, Germany, Japan, Denmark, Spain, South Korea, France and Finland.

### V. RESEARCH FINDINGS

#### A. Unit Root Test

The data used in econometric studies can be classified into three categories such as time series data, cross-sectional, panel data. With the exception of cross-sectional data, the rest of the data should be unit root tests (Samadi, 25). Traditional econometric methods to estimate the coefficients of a model were based on being steady (stationary) of time series. The time series variable is stationary when the mean, variance, covariance and thus correlation coefficient being constant during the time and it aren't important that these indices are calculated in what period of time. On the other hand, "the surveys that done since 1990, show that many of the time series variables in the economy are non-stationary" (Hozhabr Kayani, 1376, p. 52). In other words, the mean and variance of these time series were varied over time and their covariance is not stationary per given interval that this feature well known as "non-stationary" of time series. If the used time series for estimation of coefficient of model are non-stationary, the estimation of the model of such variables may be led to "spurious regression"; This means that it is possible that obtained  $R^2$  determinant coefficient from the estimated model was very high, but does not exist the significant relationship between the variables in the model. Failure to such point will be misled the investigator and incorrect presumption about the relationship among variables. Therefore, it is necessity to make be sure to being stationary or non-stationary of variables before using them (Noferesti, 1378, p. 86). One way to avoid spurious regression is ensure from being stationary of the data; hence, before estimation of the model, the statistical properties of the panel data were studied in term of being stationary or being unit root. The results of the unit root tests for the variables of the model is described in the following table, thus we see that all variables are stationary at level zero.

TABLE I. STATIONARY TEST

Variables	Test	Test statistics	P-Value	results
Corruption Perception Index (CPI)	Levin,Lin,Chu	-2.94592	0.0016	Stationary at zero level
The Degree of openness (Op)	Hardi Z-stat	5.41615	0.00	Stationary at zero level
Information technology spending (Its)	Levin,Lin,Chu	-8.10	0.00	Stationary at zero level
Number internet users (Intu)	Levin,Lin,Chu	-5.21	0.00	Stationary at zero level

VI. ESTIMATION OF MODEL

In the present model, we follow to formulate a relationship between information technology (degree of openness, information technology spending and number internet users) and corruption in the developed and developing countries. Thus the model is stipulated as follow:

$$cp_{it} = \beta_0 + \beta_1 its_{it} + \beta_2 intu_{it} + \beta_3 op_{it} + \epsilon_{it}$$

In this section of the study, after entering the data into the software and initial estimates of the parameters, the existence or non-existence of a separate intercept for each of the companies must be examined. First, one must be examined the F-Limer test and select data among the accumulated data and non- accumulated data (fixed effects or random effects); where H0 hypothesis is homogeneity of intercept (mixed) and the hypothesis H1 is heterogeneity of intercept (panel data).

$$\begin{cases} H_0: \alpha_0 = \alpha_1 = \dots = \alpha_n = \alpha \\ H_1: \alpha_i \neq \alpha_j \end{cases}$$

$$F_{(n-1,nt-n-k)} = \frac{(RSS_R - RSS_{UR}) / (n - 1)}{RSS_{UR} / (nt - n - k)}$$

If F is calculated from the F table with degrees of freedom (n-1) and (nt-n-k) is larger, the null hypothesis is rejected and therefore the bound regression has not validated and should be considered different intercepts in the estimation. The likelihood ratio test was used for this test. In the *Eviews* software and after running of the Redundant Fixed Effects-Likelihood Ratio, if the obtained prob is smaller than 0.05, the panel data method will be accepted at 95% and above, but if greater than 0.05, then the mixed method will be accepted.

TABLE II. THE RESULTS OF FIXED EFFECTS

Test Summary	Statistic	d.f	Prob
Cross-section F	0.00	2.207	1.00

As can be seen, the prob is higher than 0.05, thus the regression has a same intercepts and the mixed method is accepted.

A. The results of estimation of model

TABLE III. THE RESULT FOR FIXED AND RANDOM EFFECTS

Fixed effect				Random effect			
variable	intercept	Value of parameter	Level of probability	variable	intercept	Value of parameter	Level of probability
Op	0.59	0.04	0.00	Op	0.59	0.04	0.00
Its	0.59	0.02	0.00	Its	0.59	1.92	0.00
Intu	0.59	0.02	0.00	Intu	0.59	0.02	0.00

After formulation the model and the selection of best method, the estimation results with same intercept for selected countries are as follow:

TABLE IV. ESTIMATION OUTPUT

variable	pooled		
	Coefficient	t-statistic	Prob
OP	0.055	64.93	0.00
ITS	1.02	1.73	0.08
INTU	0.024	14.68	0.00
X3	51.45	7.30	0.000
$\bar{R}^2 = 0.870$	$R^2 = 0.871$		
D.W=2.24			

The aim of the estimation of model is explaining of the relationship between degree of openness, Information technology spending and number of internet users with corruption index in the developed and developing countries, according to the estimated probability (Prob = 0.00) the variable of degree of openness with 0.055 coefficient, we can say that there is positive and significant relationship on dependent variable, i.e. corruption he developed and developing countries during the years 1995 to 2010.

The estimated probability for the variable of information technology spending with 0.008 was calculated so showed that there is not relationship with dependent variable. According to the estimated probability (Prob = 0.00) the variable of number of internet users with 0.024 coefficient, we can say that there is positive and significant relationship on dependent variable. i.e.

corruption he developed and developing countries during the years 1995 to 2010.

The numerical value  $\bar{R}^2$  indicates that how the percentage of change in the dependent variable explained by the independent variables. In fact, if high  $\bar{R}^2$  obtains in the estimates it will be good. On the other side, if  $\bar{R}^2$  is low, which means the model is not bad. In the empirical analysis, achieving to very high  $\bar{R}^2$  not very common but even some of the estimated regression coefficients was insignificant or has signs that they are contrary to previous expectations (Gujarati, 1388, 257). In the present model,  $\bar{R}^2 = 0.87$  i.e. 87% of the variability of dependent variables is explainable by above independent variables. The statistic value of Durbin Watson for panel data is 2.24 and has small distance with number 2; On the other hand, according to the method of panel data one can be claimed the no autocorrelation and correctness of the model.

## VII. CONCLUSIONS AND RECOMMENDATIONS

In this study that the main aim was the impact of information technology on financial and bureaucratic corruption in developed and developing countries during 1995 to 2010, the panel data technique was used to estimation of model. This study will be caused to making of transparency and more practicable an attitude to information technology and communication and corruption. Findings of the work have been provided suitable context to advanced researches and provide a theoretical framework to analysis. The summary and conclusion of hypothesis of research shows that the degree of openness and the number of internet users has positive and significant relationship with corruption, i.e. the increased of number of internet users and degree of openness, the corruption is increased in the studied countries and the information technology spending has not relationship with corruption. After a scientific investigation, if the research has been performed in a systematic and scholarly process, the scholar certainly can be proposed some comments about the findings and results. Therefore, the following recommendations will be presented based on the research results to government.

- Investigation of the reasons of impact of internet development and degree of openness of economy on the corruption.
- Adopting of suitable rules in area of the development of internet with strong enforcement in order to reducing of corruption.
- The strong observation and supervision on the development of internet in the country to reducing of corruption

Strong planning and supervision of government along with increasing of degree of openness of economy to reducing of corruption.

## REFERENCES

- [1] Taghavi, Mehdi, Nikoomaram, Hashem, Ghaffari, Farhad. and Tootiyan, Sedighe. (1390), "The relationship between corruption and economic growth in OPEC member countries", *Journal of Researcher (Management)*, Year 8, No. 21, pp. 88-103.
- [2] Jahanbakhsh, Giti. 1387. "The role of ICT in reducing of corruption in the Central Bank Refah. Thesis of master Qom University campus.
- [3] Danaeefard Hassan. (1384), "Strategy to Combat with Corruption: Does technology help reduce corruption?", *Journal of Humanities Teacher*, Year 9, Number 2, row 39, Special Management pp: 101-118.
- [4] Samety, Morteza., Shahnazi, Roohollah and Dehghanshabani, Zahra (1385), "The effect of economic freedom on corruption", *Journal of Economic Studies*, No. 8, row 28, pp: 87- 105.
- [5] Sadeghi Hossein, Sabbagh Kermani, Majid and Shaghaghishahri, Vahid (1387), "Effects of fiscal decentralization on control of corruption", *Journal of Economic Research*, No. 43, row 85, pp: 207-236.
- [6] Sabbahi, Ahmad and Malik Alssadati, Saied. (1388), "the effect of control of corruption on economic growth", *Journal of Business*, Vol. 14, No. 53, pp: 131-158.
- [7] Tayyebi, Sayyed Kamal; Jabbari, Amir, Shateri, Mohammad Reza and Kouchakzadeh, Meysam (1386), Effect of Internet Use on the export (case study: 8-country of the Union "ASEAN + 3" and Iran), *Journal of Research Iran's economy*, No. 33, Ss105-127.
- [8] Abbasi Shahkooch, Kulthum, Ali Abdullahi, and Fatemeh Saghafi (1386). E-government's role in reducing of corruption in Iran.
- [9] AlizadehSaani, Mohsen and Phani. Ali Asghar. (1386), "The effect of corruption on human development countries", *Journal of Ethics in Science and Technology*, No. 2, pp: 17-24
- [10] Alavishad, Abbas., (1384), Effects of Electronic Commerce on the pharmaceutical industry, Master's thesis, Department of Management, University of Isfahan.
- [11] Hozhabrkyani, Kambiz., (1383), the impact of electronic commerce on macroeconomic variables, the Second International Conference on Electronic Commerce, Ministry of Commerce, Department of Planning and Economic Studies, Tehran.
- [12] Acemoglu, D., (1995), "Reward Structures and the Allocation of Talent", *European Economic Review*, 39: 17-33.
- [13] Alesina, A., Summers, L., (1993), "Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence", *Journal of Money, Credit and Banking*, 25(2): 151-162.
- [14] Baumol, W.J., (2004), "On Entrepreneurship, Growth and Rent-seeking: Henry George Updated". *The American Economist*, 48(1), 9-16.
- [15] Damir, P. and Praksa, E.M. (2011), "Corruption and Inflation in Transition EU Members", *Journal of Public Administration*, 8(1): 475-505.
- [16] Di tella, R. and Braun, M. (2004), Inflation, Inflation Variability, and Corruption, *Economics and Politics*, Blackwell Publishing, 16(1), pages 77-100, 03.
- [17] Fischer, S., Sahay, R., Vegh, C., (2002), "Modern Hyper- and High Inflation", *Journal of Economic Literature*, 40(3), 837-880.
- [18] Ghosh, S. and Neanidis, K.C. (2010), "Corruption in Public Finances, and the Effects on Inflation, Taxation, and Growth, Centre for Growth and Business Cycle Research", *Discussion Paper*, (140):1-33.
- [19] Gulzar, S., Shafi, K. and Siddiqui (2011), "Does Correlation Exist Between Inflation and Corruption", *Journal of Cotemporary Research in Business*, 2(9): 390-397.