Economy and Transparency: The Model Invention

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ABSTRACT

Relation of Transparency and Economic growth is a long global debate in the society. Theoretically, policy makers, scholars and researchers argue that there is a close relation among these two variables. However, the quantitative relation and any global model is yet unrevealed. So, the main aim of this paper is to ascertain the nature, dimension and extent of the relationship between economy and Transparency as well as to invent a global model. This paper is useful for researchers, planners, policy makers and scholars who are directly or indirectly involved or willing to involve in the thrust for quantitative relation of these two variables. Literature review is the main source of information of this study. In introductory section, this paper briefly describes theoretical relationship of economy and Transparency as well as it also describes the proxy variables.GDP (2012) of different countries are used as proxy of Economy and Corruption Perception Index (CPI) scores (2012) of different countries are used as proxy of level of Transparency. In methodology section this paper describes the detail methodology, sampling procedure and level of analysis. This study randomly selects 30 countries (10 from higher CPI scores+10 from moderate CPI scores+ 10 from lower CPI scores) around the globe as sample. In the third section, this research presents the correlation value which divulge that there is a positive correlation (p=.047) with 95% confidence level. That reveals, if the level of transparency of any country increase, the GDP also increase accordingly. Then in this section two quantitative models are developed using linear regression analysis. First invented model is: Economy (GDP in billion US$) = [(8.983*Level of transparency) -108.11]. This paper termed the first invented model as "Mahmud EcoT Model-1". This model calibrates that one unit improvement of transparency leads 8.98 billion US$ improvement in the GDP of a country. Then taking this unit change proportion, this research concoct second model for prediction purpose. The second invented model is: Predicted GDP in billion US$ of a country=Present GDP of the country +8.98*Targeted level of transparency improvement .The second invented model is termed in this research as "Mahmud EcoT Model-2". This model is applicable for any country around the globe for prediction of economic growth according to the targeted Transparency level. In the last section, this paper briefly describes the application of the "Mahmud EcoT Model-2" taking Bangladesh and Romania as two case countries.

KEYWORDS: *Economy, Transparency, Model.*

JEL CLASSIFICATION: *C12, C31, D04, D73, O20, Y10*

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INTRODUCTION

Transparency persuades important aspects of social and economic life. The level of transparency in a given country is extensively believed to be a significant factor to consider when projecting economic growth as well as making decisions for strategic investments and forming international policies. The United Nations top anti-crime official, Antonio Costa, estimates that Zaire and Nigeria, two of Africa's hardest-hit states, have lost some $5 billion each in the last few years to corruption. In Pakistan, an estimated 30 percent of the price of all public works projects goes to kickbacks and bribes, while in Bangladesh corruption eats up about half of all foreign investments (Stevenson, 2003). But corruption is not only a third-world phenomenon. While it is undeniably more prevalent in authoritarian less developed countries, also democratic, western societies are not free of corruption (Wouter & Albert, 2009). However, the relation between transparency level and key parameters of economic performance is largely qualitative (Davoodi, 2000; Hines, 1995; Huntington, 1968; Leff, 1964; Svensson, 2005; Tanzi at al., 1992; Wei, 2000). Transparency has become progressively more important with the globalization of the international economic and political relations between countries, which has escorted various governmental and non-governmental organizations to search for adequate measures to quantify levels of transparency (Kaufmann, et al., 2003; Knack & Keefer, 1995; Mauro, 1995; Svensson, 2005). However, a specific functional dependence between quantitative measures of transparency and economic performance has not been established yet. Thus, an open question remains whether there is a general functional relation between transparency level and key aspects of the economic performance of different countries. So, the objective of the present research is to quantify the relationship between level of Transparency and Economy and to develop a global model.

To examine the objective, Null Hypothesis is set as H_0= There is no relationship between Economy and Level of Transparency. To represent Economy, different countries GDP in US$ (2012) is chosen as proxy variable and to represent Level of Transparency, Corruption Perception Index score (2012) is chosen as proxy.

The gross domestic product (GDP) is one the primary indicators used to gauge the health of a country's economy. It represents the total dollar value of all goods and services produced over a specific time period - it can be termed as the size of the economy. One can imagine, economic production and growth, what GDP represents, has a large impact on nearly everyone within that economy. For example, when the economy is healthy, you will typically see low unemployment and wage increases as businesses demand labor to meet the growing economy. A significant change in GDP, whether up or down, usually has a significant effect on the society.

Transparency International commissioned Johann Graf Lambsdorff of the University of Passau produce the Corruption Perceptions Index (CPI). The 2012 CPI draws on 13 different surveys and assessments from 12 different institutions. The institutions are the African Development Bank, the Bertelsmann Foundation, the Economist Intelligence Unit, Freedom House, Global Insight, International Institute for Management Development, Political and Economic Risk Consultancy, Political Risk Services, the World Economic Forum, the World Bank and the World Justice Project. The 13 surveys/assessments are either business people opinion surveys or performance assessments from a group of analysts. The CPI measures perception of corruption due to the difficulty of measuring

absolute levels of corruption. In 2012, the commission conducts CPI on 174 countries. The upper limit of score is 100 and lower limit is 0. The higher CPI score means the perception of high level of transparency and lower CPI score means the perception of lower level of Transparency. This research will use the same upper and lower limit to analyze the level of Transparency.

This research paper will first test the null hypothesis (Ho) on the basis of the above mentioned two proxy variables by correlation test and then if the null hypothesis is rejected it will go for the model invention by regression analysis. The invented model will apply on two case country; Bangladesh and Romania, to predict their economic growth according to the targeted transparency level.

1. METHODOLOGY

The study is conducted under five steps. In its first step, literature review is conducted to gather knowledge about theoretical relation between Economy and Transparency as well as to obtain Corruption Perception Index (CPI) Score and Gross Domestic Product (GDP) of different countries (2012 estimation). To outline the sampling framework, step-2 is conducted and 30 countries are chosen randomly (10 countries from upper level transparency + 10 countries from mid level transparency+ 10 countries from lower level transparency); see Map-1.

Figure 1. Location of the sample countries in the World Map
Source: Prepared by the Author using SketchUp, 2013

To accept or reject the null hypothesis, two tailed Bivariate correlation test is conducted at 95% confident level, in its third step. To invent the model of Economy and Level of Transparency, fourth step is conducted with Liner regression analysis. In its last stage, invented model is applied on two countries to predict the Economic Growth according to the targeted Level of Transparency Increase. In this step, Bangladesh and Romania are chosen as two case countries. Detail methodology is outlined in the below table (Table 1).

Table 1. Synopsis of the methodology

Steps	Purpose	Level of analysis
Step-1: Literature review	▪ To gather knowledge about theoretical relation between Economy and Transparency ▪ To obtain Corruption Perception Index (CPI) Score 2012 ▪ To obtain Gross Domestic Product (GDP)	• Synthesis the available literature • Preparing the CPI Score sheet • Preparing the GDP Score sheet • Hypothesis formulation: H_0= There is no relationship between Economy (GDP) and Level of Transparency (CPI score) H_A= There is a relation between Economy (GDP) and Level of Transparency (CPI score)
Step-2: Sampling	▪ To outline the sample framework	• Categorize the CPI score in 3 cluster according to their CPI ranking • The countries which have 1 to 58 CPI rank treated as high level transparency (Cluster-1) • The countries which have 58 to 116 CPI rank treated as mid level transparency (Cluster-2) • The countries which have 116 to 174 treated as low level transparency (Cluster-3) • From each cluster 10 countries are selected randomly and thus got 30 countries for analysis
Step-3: Relation test	▪ To accept or reject the null hypothesis that is H_0= There is no relationship between Economy (GDP) and Level of Transparency (CPI score)	• Two tailed Bivariate correlation test to observe the relation at 95% confident level
Step-4: Model Invention	▪ To invent the equation of Economy and Level of Transparency	• Liner regression analysis
Step 5: Implication of the Model	▪ To Predict the future Economic Growth, if the Level of Transparency Increase	• Apply the invented model on two case country to predict the Economic Growth, if the Level of Transparency Increase (Bangladesh and Romania are chosen as two case countries)

Source: Prepared by the author, 2013

2. MODEL INVENTION AND CALIBRATION

The CPI score and GDP of the sample countries are given in the below table (Table-2)

Table 2. CPI score and GDP in billion US$ of the sample countries

Name of The Sample Country	CPI score[i]	GDP in billion US$[ii]
1. Denmark	90.0	313.6
2. Sweden	88.0	526.2
3. Switzerland	86.0	632.4
4. Belgium	75.0	484.7
5. Chile	72.0	268.2
6. France	71.0	2609.0
7. Austria	69.0	398.6
8. Ireland	69.0	210.4
9. Qatar	68.0	183.4
10. Poland	58.0	487.7
11. Czech Republic	49.0	196.1
12. Phillipines	47.0	250.4
13. Oman	47.0	76.46
14. Solvakia	46.0	91.92
15. Kuwait	44.0	173.4
16. Tunisia	41.0	45.61
17. Sri Lanka	40.0	59.41
18. Jamaica	38.0	15.25
19. Zambia	37.0	20.52
20. India	36.0	1885.0
21. Vietnam	31.0	138.1
22. Togo	30.0	3.685
23. Uganda	29.0	21.0
24. Nepal	27.0	19.42
25. Bangladesh	26.0	122.7
26. Eritrea	25.0	3.092
27. Laos	21.0	9.217
28. Haiti	19.0	7.902
29. Sudan	13.0	59.94
30. Afganistan	8.0	19.91

Source: Prepared by the author, 2013

To ascertain the relationship between Economy (GDP) and level of Transparency (CPI Score) a two tailed correlation test is conducted with 95% confidence level. The null hypothesis is set as Ho= There is no relationship between Economy (GDP) and Level of Transparency (CPI score).

Table 3. Bivariate Correlations test

		Transparency score (CPI Score)	Economy: GDP in US$ (billion)
Transparency score (CPI Score)	Pearson Correlation	1	.366[*]
	Sig. (2-tailed)		.047
	Sum of Squares and Cross-products	15294.667	137394.762
	Covariance	527.402	4737.750
	N	30	30
Economy: GDP in US$ (billion)	Pearson Correlation	.366[*]	1
	Sig. (2-tailed)	.047	
	Sum of Squares and Cross-products	137394.762	9204012.903
	Covariance	4737.750	317379.755
	N	30	30

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Correlation result in SPSS conducted by the author, 2013

In the correlation test the significant value is .047 which is less than the magic p=0.05 value and the Pearson Correlation value (.366) is bigger enough to assume that there is a relation between the two variables; Economic growth and Transparency score. So, with 95% confident level we can reject the null hypothesis (Ho) and accept the alternative hypothesis: H_A= There is a relation between Economy (GDP) and Level of Transparency (CPI score). The R^2 value (0 .366) indicates that the correlation line starts from left to right and there is a positive correlation between the two variables. That reveals that when the Level of Transparency Increase the GDP also increase.

Now we know that there is a positive correlation among the two variables but we don't know the extent and dimension of the relationship. To ascertain the extent and dimension among these two variables, a liner regression analysis is conducted.

The equation of liner regression is:

$$Y = BX + A \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \tag{i}$$

Where,

      Y=Dependent Variable,
      X=Independent variable,
      B=Coefficient
      A= Constant value

In this study, Level of Transparency (CPI Score) is causal in nature and Economy (GDP) is assuming as its effect. So, the Dependent Variable Y is Economy and independent variable X is Level of Transparency. Now we can put the X and Y value in the equation (i) then we will find the equation like below:

Economy (GDP in billion US\$) =B*Level of transparency + A………………………… (ii)

Now to obtain the value of B and A, Liner regression is conducted and the results are shown in the below tables and figures (Table-4&5; Figure-2&3).

Table 4. Liner Regression test-Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.366[a]	.134	.103	533.51164

a. Predictors: (Constant), Level of Transparency (CPI score)

b. Dependent Variable: Economy (GDP in billion US\$)

Source: Regression result in SPSS conducted by the author, 2013

Table 5. Liner Regression test-Coefficients[a]

Model		Un-standardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Constant)	A= -108.107	223.643		-.483	.633
	Level of Transparency	B= 8.983	4.314	.366	2.082	p=.047

a. Dependent Variable: GDP in billion US\$

Source: Regression result in SPSS conducted by the author, 2013
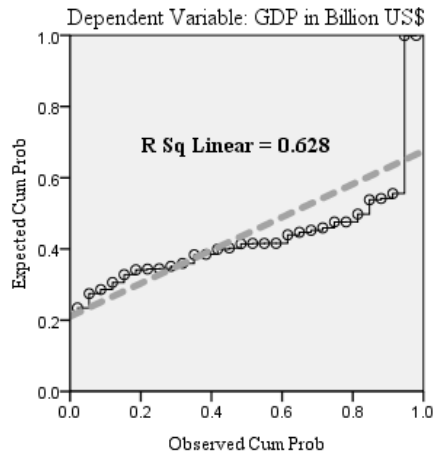
Figure 2. Normal P-P Plot of Regression Standardized Residual
Source: Regression result conducted by author, 2013

In figure-2, R square denotes that there is a linear relation among the two variables and the proportion of variance of GDP in billion US\$ is 0.628. It also reveals that, the distribution of observed residuals matches up nicely with the distribution we would expect under normality. The residuals fall along a straight line. However, there are two variables which are up from the normality.
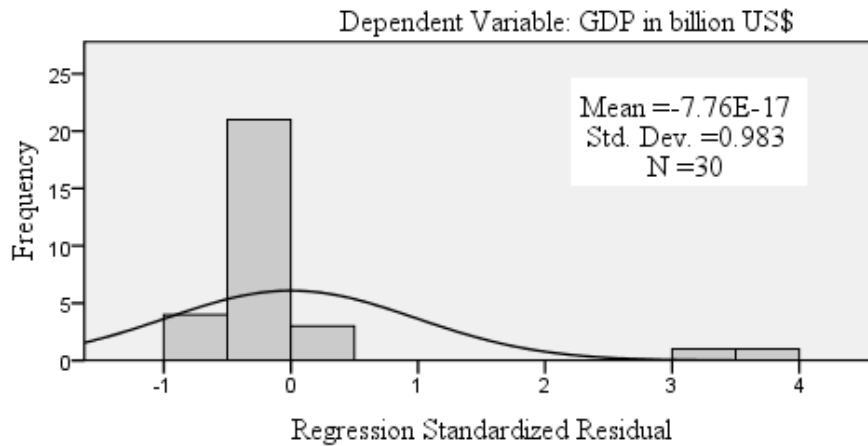
Figure 3. Histogram
Source: Regression result conducted by author, 2013

As can be seen from the above plot (Figure-3), the standardized residuals are generally what can be labeled "well-behaved". They do not exhibit any serious departure from normality, though the plot does indicate two residuals are somewhat distant from the others, at close to +3 and +4 standard deviations away from the mean. The standard deviation is also normal (0.983).

Now putting the value of A and B from Table-5 in the equation (ii); the equation looks like below:

Economy (GDP in billion US$) of a country = (8.983*Level of transparency of that country) -108.11…… (iii)

So, equation (iii) is the first invented model on economy and transparency (The author termed it as "Mahmud EcoT-Model-1", those who will use it in future is requested to term it properly). In the subsequent analysis this paper will term it as "Mahmud EcoT-Model-1".

Let's test the accuracy of the "Mahmud EcoT-Model-1", suppose, we are in the year of 2011 and predicting the GDP of Bangladesh. We are assuming that we will obtain the Level of Transparency = 26 by the year 2012. The model predicted the value of Economy (GDP in billion US$) = (8.983*26) -108.11=125.45 billion US$ and if now, we compare it with the present GDP (2012) is 123 (Table-2). The predicted value is almost closer to the real value. This reveals that the model can forecast the future GDP accurately with 95% confidence level according to targeted Level of Transparency.

"Mahmud EcoT-Model-1" tells that how much GDP will increase if the level of transparency increases. For instance, if the level of transparency of any country is 30, the GDP will be (8.983*30) -108.11=161.38 billion US$ and if the level of transparency increase one unit that is from 30 to 31 the GDP will be (8.983*31) -108.11=170.36 billion US$. Hence, one unit improvement of transparency leads (170.36-161.38=8.98) 8.98 billion US$ improvement in the GDP.
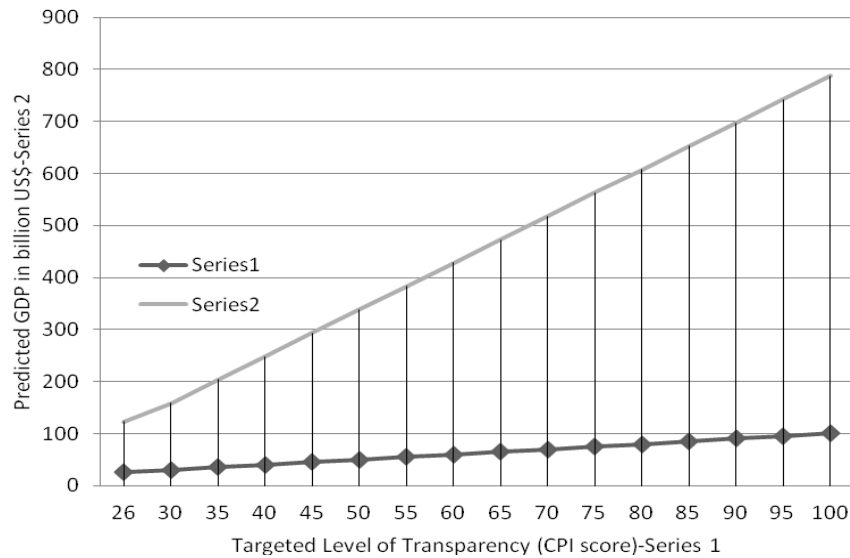
"Mahmud EcoT-Model-1" can forecast the GDP in respect of targeted Transparency Level. But the debate is that, if USA and Bangladesh achieve same level of transparency then according to this model their predicted GDP will be same. But it is not realistic. Obviously, there are some other factors which also lead the GDP of a country such as; area, population, educational status, political context etc. So, to include the values of other third factors in the model, this paper now going to develop another model which this research termed as "Mahmud EcoT-Model-2"

According to the above discussion, this research discover that one unit improvement of transparency leads 8.98 billion US$ improvement in the GDP of a country. So, adding this unit change with present GDP of a country, future GDP of that country can be forecasted according to the targeted level of transparency improvement. The new model now looks below:

Predicted GDP in billion US$ of a country = Present GDP of that country +
+ 8.98*Targeted level of transparency
improvement[iii] …… (iv)

So, equation (iv) is the second invented model on economy and transparency (The author termed it as "Mahmud EcoT-Model-2", those who will use it in future is requested to term it properly). In the subsequent analysis this paper will term it as "Mahmud EcoT-Model-2".

"Mahmud EcoT-Model-2" is more realistic, as it will not give the same value for USA and Bangladesh. It will give different predicted values for different countries. It also considers other causal factors involvement in the model as it considers the present GDP in the equation. Present GDP is the outcome of all factors of a country. So, Model-2 considers all causal factors. Model-2 can predict the future GDP of any country according to the targeted level of Transparency assuming that all other causal factors will remain constant.

3.   IMPLICATION OF THE MODEL

"Mahmud EcoT- Model-2" is applicable for any country around the globe. For the experiment purpose, Bangladesh and Romania are chosen as two case countries to apply the invented model and to predict the Future economic growth according to the targeted Level of Transparency progress.

3.1 Case Country-1: Bangladesh

Present GDP of Bangladesh is 122.70 (according to the 2012 estimation-see Tab-1) and present Level of Transparency is 26 (according to the 2012 CPI score). If the country targeted to achieve 30 level of Transparency, then, the country actually wants to improve 4 unit of transparency (Targeted CPI score 30-Present CPI score 26=4). Now, according to the "Mahmud EcoT-Model-2" the predicted GDP of Bangladesh will be: 122.70 + (8.98*4) = 158.62 billion US$. Figure below predicts the GDP growth of Bangladesh according to different targeted level of Transparency.

According to, Figure-4, which is prepared applying "Mahmud EcoT-model-2", the GDP of Bangladesh will be 200 billion US$ if the country can achieve 35 Transparency level (CPI Score). If the country can achieve 55 Level of Transparency it will achieve GDP above 350 billion US$. Thus, if the country can achieve 80 Level of Transparency the GDP of Bangladesh will be 600 billion US$.

Figure 4. Predicted GDP of Bangladesh
Source: Prepared by the author applying "Mahmud EcoT-Model-2", 2013

3.2 Case Country-2: Romania

Present GDP of Romania is 169.4 billion US$ (according to the 2012 estimation)[2] and present Level of Transparency is 44 (according to the 2012 CPI score)[1]. If the country targeted to achieve 50 level of Transparency, then, , the country actually wants to improve 6 unit of transparency (Targeted CPI score 50-Present CPI score 44=6). Now, according to the "Mahmud EcoT-Model-2" the predicted GDP of Romania will be: 169.40 + (8.98*6) = 223.28 billion US$. Figure below predicts the GDP growth of Romania according to different targeted level of Transparency.
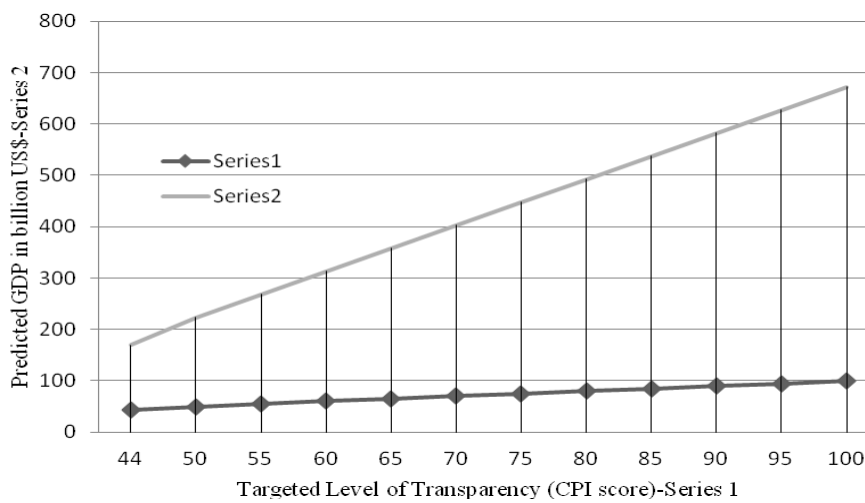

Figure 5. Predicted GDP of Romania
Source: Prepared by the author applying "Mahmud EcoT-Model-2", 2013

According to, Figure-5, which is prepared applying "Mahmud EcoT-model-2", the GDP of Romania will be just above 200 billion US$ if the country can achieve 50 Transparency level (CPI Score). If the country can achieve 60 Level of Transparency it will achieve GDP above 300 billion US$. Thus, if the country can achieve 80 Level of Transparency the GDP of Romania will be near about 500 billion US$.

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[i] CPI scores Obtain from: Transparency International (TI): http://www.transparency.org/cpi2012/results

[ii] GDP Obtain from: The World Fact book: Central Intelligence Agency (US) https://www.cia.gov/library/publications/the-world-factbook/fields/2195.html

[iii] Targeted level of transparency improvement= Targeted CPI score-Present CPI score