Growth and Corruption: A Complex Relationship

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Abstract

This paper investigates the growth-corruption relationship in a sample of 146 countries for the period 1984-2009 using panel generalized method of moments. While negative effects of corruption on growth have drawn economists' interest in recent years, our main contribution is to examine the effects by employing the hierarchical polynomial regression to evaluate the relationship after controlling economic and institutional factors. The result challenges some of the findings that negative growth-corruption association in the literature, but also provide new inferences. The findings reflect that corruption is not always growth-inhibitory, for some countries it is growth-enhancing which supports the "grease the wheels" hypothesis. However, our results suggest that a cubic function best fitted the data.

Keywords: Corruption, Growth, GMM

JEL Classification: K42, O57, O50

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1. INTRODUCTION

Is corruption growth-enhancing than growth-inhibitory? This question captivated scholars studying developing countries in the late 1960s onwards, because the presence of corruption represented an apparent anomaly. The corrupt practices of public officials affects the cost and incentive structures faced by the firms and households, economists have long been interested in analysing how corruption affects the performance of an economy, in particular the rate of growth. Observed performance in many of the new emerging states engenders greater attention to revisit the relationship between growth and corruption.

Our purpose is to offer a systematic analysis for observed cross-country differences in growth and corruption. The principal part of our analysis draws on data about levels of corruption for over 146 countries for the period 1984-2009 reported by International Country Risk Guide (ICRG). We supplement this with an additional analysis of a second dataset on corruption perception index measured by Transparency International (TI) since 1995. The advanced panel estimation techniques have been utilised after controlling for fixed effects and endogeneity biases by employing system generalised methods of moments (SGMM), the most advanced, robust and well recognised technique in the literature.

2. EXPLORING THE GROWTH-CORRUPTION RELATIONSHIP

The prevailing view is that corruption has adverse effects on investment and economic growth. A payment of a bribe to get an investment licence, for example, clearly reduces the incentive to invest (Bardhan, 1997, p. 1327). Corruption, particularly political or “grand” corruption, distorts the decision-making process connected with public investment projects (Tanzi and Davoodi, 1997). Corruption is likely to increase the number of projects undertaken in a country, and to change the design of these projects by enlarging their size and complexity. The net result is an increase in the share of public investment in GDP, a fall in the average productivity of that investment and (because of budgetary constraints) a possible reduction in some other categories of public spending, such as operation and maintenance, education and health. As a consequence, the rate of growth of a country decreases.

Murphy et al. (1993) point out that an increasing return in rent-seeking activities lowers the cost of further rent-seeking relative to that of productive investment. When there is slow growth, the returns to productive activity fall relative to those of rent seeking. The ensuing increase in the pace of rent-seeking activities further slows down growth. It is also argued that public rent-seeking attacks innovation, since innovators need government-supplied goods such as permits and licences more than established producers.

Another growth effect follows from the allocation of talent. Murphy et al. (1991, p. 503) states that “people choose occupations that offer the highest returns on their abilities when they are free to do so”. Rosen (1981) claims that the ablest people choose occupations that exhibit increasing returns to their ability since the increasing returns allow “superstars” to earn extraordinary returns on their talents. When talented people become entrepreneurs, they help to improve the technology in the lines of business they pursue, and, as a result, productivity and income grow. In contrast, when they become rent-seekers, most of their private returns come from redistribution of wealth from others and not from wealth creation. As a result, talented people do not improve technological opportunities, and the economy stagnates. When rent-seeking sectors offer most able people higher returns than the productive sectors offer them income, growth can be much lower than possible. Bhagwati et al. (1984) also asserts that corruption affects the allocation of human capital because it affects the returns on rent-seeking vis-a-vis productive activities.

Some of these growth effects have been statistically substantiated from cross-country data by Mauro (1995) and his study finds that there is a negative and significant association between corruption and growth via the effect on investment. Although the magnitude of the effect is considerable however, this study does not provide any robust evidence because the analysis is not adequate for the dynamic perspective. Furthermore, Mauro (1997, 1998) finds that corruption reduces expenditures on health and education. As the opportunities to extract high rents from public expenditures on education and health are relatively less, corruption distorts public expenditures away from health and education and encourages excessive infrastructure and capital intensive investment. Hence, corruption reduces the productivity of public investment and the country's infrastructure, which, in turn, has a damaging impact on the country's economic growth. Gupta et al. (2001) confirms that corruption is associated with higher military spending as a share of both gross domestic product and total government spending, as well as with arms procurement in relation to GDP and total government spending.

Wei (1997) analyses the adverse effects of corruption on foreign direct investment (FDI) and finds that corruption, acting like a tax, reduces foreign direct investment. He concludes that the less predictable the level of corruption, the greater is its impact on FDI, as higher variability discourages foreign direct investment by increasing risk and uncertainty. In another study, Mo (2001) introduces a new perspective on the role of corruption in economic growth and the most important channel through which corruption affects economic growth is political instability. In other words, corruption is most prevalent where other forms of institutional inefficiency, such as bureaucratic red tape and weak legislative and judicial systems, are present.

Oppositely, other studies (led by Leff, 1964 and Huntington 1968) claim that bribery and corruption can have positive effects. The efficiency-enhancing strand views corruption as increasing efficiency because corruption 'greases the wheels'. In the context of pervasive and cumbersome regulations in the developing countries, corruption may actually improve efficiency and help growth. In examining the positive effect of corruption on growth Méon and Sekkat (2005) and Mendez and Sepulveda (2006), incorporate the interaction term between corruption/quality of government and economic freedom, find that corruption is beneficial to growth only with good governance and in a free country.

Recently, Swaleheen (2011) test corruption-growth relationship in a non-linear frame work (second degree polynomial) but the results show that corruption is not growth reducing at all levels and it significantly increases growth even at a higher level of corruption.[1] In other words, corruption is more growth reducing when incidence of corruption is low than in countries where incidence of corruption is high. More importantly, this finding is rejecting the Shleifer and Vishny (1993) hypothesis that "corruption sands-in-the-wheel". This result

[1] This paper finds that corruption increases growth even in the second degree equation, for details, see page 35.

indeed fuels the so-called debate whether corruption is growth-enhancing or growth-reducing following two approaches, corruption as oil and corruption as sand in the machine, respectively.

By far, most empirical findings favour the negative linear relationship between corruption and growth i.e. corruption reduces growth, however, there is a gap in the literature to justify the relationship whether it is positive or negative, if so then when and what circumstances. There is a rare cross-country study which captures the non-monotonic behaviour of corruption in influencing growth systematically. This paper evaluates the non-monotonicity of corruption-growth relationship in a neoclassical growth model after extending the data set and controlling for fixed effects and endogeneity biases by utilising system generalised methods of moments (SGMM). The purpose is to examine the non-linear effects to determine whether results are consistent with the theory.

3. MODELS, DATA AND ECONOMETRIC METHODOLOGY

In order to examine the relationship between growth and corruption we start with a model of economic growth where the explanatory variables are standard used in the literature. The model is structured as follows:

$$g_{it} = \alpha_0 + \alpha_1 g_{it-1} + \alpha_2 CORR_{it} + \alpha_3 (CORR)^2_{it} + \alpha_4 (CORR)^3_{it} + \beta^1 X^1_{it} + \beta^2 X^2_{it} + \eta_i + \varepsilon_{it} \qquad (1)$$

where g is the growth rate of real GDP per capita and *CORR* is the incidence of corruption. X^1 is the vector of variables used by most cross country growth studies which have been able to explain a significant portion of the variation in real GDP per capita growth. They are SEC (secondary school enrollment rate), Popgr (the growth rate of population, Grat (government final consumption expenditure as a share of GDP)) and Irat (investment GDP ratio). X^2 is the vector of institutional variables that include Open and Democracy (average of political rights and civil liberties). α_0 is constant, β^1 and β^2 are vectors of coefficients, η is unobserved country fixed effects and ε is error term. Subscripts i is country t is time.

The purpose of including lagged per capita GDP growth rate is to consider the convergence effect highlighted the in the neo-classical growth model and it is expected that the sign of the coefficient is negative. The sign and significance of $\alpha_{2,}$ α_3 and α_4 are of interest;

CORR coefficients are expected to be negative if corruption deteriorates the overall economic growth at all levels.

Following neo-classical growth theory it is expected that a higher school enrollment and investment ratio to GDP should boost economic growth whereas, population growth and a higher value of government final consumption expenditure negatively affect the growth rate of per capita income (Mankiw et al., 1992). Theory suggests that the impact of openness and democracy should have positive impact on growth (Krueger, 1974 and Barro, 1999).

The major obstacles of comparative studies of corruption have been the lack of a general definition of corruption and the absence of objective cross-national data on corrupt behaviour given its illegal and secret nature. The subjective index of corruption is used as a principal measure, source from International Country Risk Guide (ICRG). The ICRG index is constructed by Political Risk Services.[2] It measures the corruption within the political system that threatens foreign investment by distorting the economic and financial environment and reducing the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability. For simplicity and ease of exposition, the ICRG index has been converted into a scale from 1 (least corrupt) to 10 (most corrupt). We also use Transparency International's Corruption perception index (CPI) for robustness check. The CPI index is a composite index based on individual surveys from different sources. The index is rescaled in the same scale like the ICRG index.

Real GDP per capita growth (Rgdppcygr) is the dependant variable. The Rgdppc, openness (Open), and population (Pop) data are obtained from Penn World Table. Data on investment (Irat), government final consumption expenditure (Grat) and secondary school enrolment (Sec) are taken from the World Bank's World Development Indicators (WDI) database. The data are based on annual observations however, we use both annual and the series' long run information by taking averages over five year time intervals (five year time intervals: 1984-1988, 1989-1993, and so on). Due to missing data, the total number of countries used in any regression ranges from 128 to 146 for the period 1984-2009.

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[2] The definition of corruption used is the misuse of public office for private enrichment in this study. See the Political Risk Services (PRS), http://www.prsgroup.com/countrydata.aspx. Also, the PRS data set is regarded as a reliable quantitative measure for the cross-national comparisons and it covers a large number of countries and is available since 1984.

3.1. Methodology

In order to estimate the impact of corruption on growth, our benchmark model (equation 1) is estimated with ordinary list square (OLS), fixed effects and system GMM. Many researchers used OLS and 2SLS[3], but there are advantages of GMM over IV and OLS. If heteroskedasticity is present, the GMM estimator is more efficient than the simple IV estimator. According to Baum et al (2003), page 11-"------if heteroskedasticity is not present, the GMM estimator is no worse asymptotically than the IV estimator". OLS estimation pools observations across cross sections and by using all the variation in the data tends to be more efficient than performing individual OLS on repeated cross sections. The pooled OLS, however, fails to account for the potential endogeneity of the right hand side variables. Specifically, it fails to account for potential country specific variations which are unmodelled and unobserved. In general, the variables measured with an error term tend to display a bias toward zero and OLS does not account for standard errors from the first stage estimator (see Arellano et al. 2009). Moreover, GMM addresses potential endogeneity concerns between the set of cross-country regressors and other country specific characteristics. Further, our model consists of more moment conditions than model parameters, and our panel dataset consists of a short time dimension and a larger country dimension ($N = 150$)[4]. Therefore the use of GMM in this paper is appropriate as it addresses potential endogeneity problems of the regressors and incorporates fixed effects. Arellano and Bond (AB, 1991) pioneered the difference-GMM estimator while the system-GMM estimator is a product of the work done by Blundell and Bond (BB, 1998). Identification in both types of estimators is based on first-differencing and using lagged values of the endogenous variables as instruments. In the difference-GMM estimator (GMM-DIFF), lagged levels are used to instruments for the differenced right hand side variables, while for the system-GMM estimator (GMM-SYS) the estimated system is composed of a difference equation instrumented with lagged levels and additionally a level equation, which is estimated using lagged differences as instruments (Bond et al. 2001; Rajan

[3] For example, Chervin and Wijnbergen (2010) used OLS and 2SLS while estimating growth equation using aid volatility.

[4] If the time dimension is large, then dynamic panel bias becomes insignificant – in such a case, a fixed estimator is recommended (see Roodman 2006). Further, as the time dimension of the panel increases, the number of instruments in the GMM-SYS and GMM-DIFF tends to explode; additionally, as the cross-sectional dimension increases, the Arellano-Bond autocorrelation test may become unreliable.

& Subramanian 2008)[5]. We report results using GMM-SYS as SGMM is better technique than Difference GMM.

We test the instrument validity by using Sargen test/Hansen's J statistic of over-identifying restrictions. The Hansen's J statistic is used in place of the Sargan test of over-identifying restrictions because of its consistency in the presence of autocorrelation and heteroscedasticity (Neanidis & Varvarigos, 2009; Roodman, 2007). We make sure we check whether deeper lags of the instrumented variables are correlated with deeper lags of the disturbances.

4. EMPIRICAL RESULTS

The relationship between growth and corruption is illustrated with a fitted line in the scatter plots in Figure 1. The curve shows an existence of a non linear relationship i.e. the curve is clearly increasing in the middle range of corruption and decreasing where corruption is least and most. The non-linear fitted line suggesting that the "sand the wheels" hypothesis exists at the polar ends of corruption whereas, in the middle range corruption "greases the wheels". In order to confirm this result the next step begins by estimating equation 1 with OLS for five year average data and the results are reported in Table 1. The corruption coefficients (measured by ICRG index) illustrate a negative linear term , positive squared term and negative cubed term indicating that beginning at the origin, the function first tended downward, then upward then downward again (column (1)). In other words, the results suggest that corruption is growth reducing in the least and the most corrupt countries but for the medium corrupt countries it is growth enhancing.

[FIGURE 1 ABOUT HERE]

The other control variables show the expected signs. The coefficient of lagged per capita growth is positive but not significant. The coefficients for secondary school enrolment and investment are positive which increase growth. On the other hand, population growth and government final consumption expenditure coefficients are significant and negative in signs.

[5] We use the xtabond2 command in STATA 10 to conduct all GMM-DIFF & GMM-SYS regression analyses while the GMM estimations were implemented using STATA 10's in-built *xtabond* command.

Openness has a positive sign although not significant. The coefficient for democracy is negative (due to the inversion of democracy index and Rgdppcygr) indicating that democracy enhances growth.

[TABLE 1 ABOUT HERE]

Column (2) shows the results for fixed effects. The coefficients for corruption (linear, squared, and cubed terms) confirm the similar sign and significance level presented in column (1). Except lagged Rgdppcygr, other control variables have the expected sign. Overall, fixed effects result show that the partial effect of corruption on the rate of growth of real per capita GDP is statistically significant. The OLS and fixed effects estimation results using annual data strongly support our results (columns (3) and (4)). The similar results are obtained when corruption is measured by the CPI index (columns (5)-(8)) although corruption coefficients are not always significant.

Table 2 displays the results for GMM-system estimation. Column (9) shows that the linear coefficient for corruption is negative but not significant. The quadratic model in column (10) illustrates a positive linear term and a negative quadratic term indicating a non-monotonic growth-corruption relationship although not significant. However, the results for the cubic model (column (11)) give a negative linear, a positive squared and a negative cubed term; all of these terms are highly significant. This result is robust and supports the results in Table 1. Moreover, the estimation results using annual series as well as CPI index confirm the significant cubic relationship between growth and corruption (columns (12)-(18)). The results indicate that corruption is not always growth deteriorating; it enhances growth for the medium corrupt countries. The model passes the Sargan test in most of the cases with few exceptions. The model also passes the test of absence of AR (2) in the error term in all cases which reveals the absence of second order serial autocorrelation. With robust estimation investment ratio to GDP is positive and statistically significant. The linear, squared and cubed coefficients of corruption continue to be statistically significant.

[TABLE 2 ABOUT HERE]

The next step estimates the turning points of the cubic model. The relationship between growth and corruption begins with a negative relationship (see Figure 1) until growth reaches its (local) minimum at a corruption score of around 3.5 where it changes direction (i.e. negative to positive) and then achieves a maximum at around 7.5 and then starts to decrease again. In other words, the growth rate of per capita income decreases with a corruption score less than 3.5, followed by an increase in the growth level with corruption level between 3.5 and 7.5, and finally growth decreases substantially at the corruption scores that are larger than 7.5. The list of least, medium and the most corrupt countries is presented in Table 3. The results reflect that corruption is growth-inhibitory for the least and the most corrupt countries whereas, it is growth-enhancing for the medium corrupt countries.

[TABLE 3 ABOUT HERE]

Finally we estimate the growth corruption relationship across least corrupt, medium corrupt and the most corrupt countries based on turning points i.e. corruption level below 3.5, between 3.5 to 7.5 and above 7.5. The estimate for the least corrupt countries (Column (19) Table 4) shows corruption coefficient is negative although not significant illustrating that growth level decreases as the level of corruption increases. In comparison the middle corrupt countries with corruption level between 3.5 to 7.5 (column (20) Table 4) displays a positive and significant corruption coefficient suggesting that corruption enhances economic growth in these countries. But the most corrupt countries demonstrate that corruption is a bad news for them (column (21)). When corruption is measured in terms of CPI provides the similar results and significant at least 10 percent level.

[TABLE 4 ABOUT HERE]

5. CONCLUSION

The negative effects of corruption have drawn economists' interest in recent years. This paper evaluates the relationship between growth and corruption by employing a hierarchical polynomial regression after controlling economic and institutional factors. In other words, it test whether "sand the wheels" hypothesis always apply in growth-corruption relationship.

Our results find that there is a cubic relationship between growth and corruption, such that, for the least corrupt countries corruption impedes growth, but at intermediate levels corruption increases growth, and finally, at a higher level it substantially reduces growth. Hence, the “sand the wheels” hypothesis applies only in the polar cases; otherwise, corruption “greases the wheels” at the intermediate levels.

Our empirical results confirm this cubic relationship for various estimation methodologies and corruption indices. In all empirical tests the cubic corruption coefficients are found to be significant at least 10 percent level. In the system GMM for ICRG index the corruption coefficients are significant at the 1 percent level. The model passes the Sargan test and the absence of AR (2) process in the error term. In terms of turning point, we found corruption increases growth within the range around 3.5-7.5. This pattern is consistent with the “grease the wheels” hypothesis that in the medium corrupt countries corruption stimulates growth by reducing red-tape.

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Figure 1

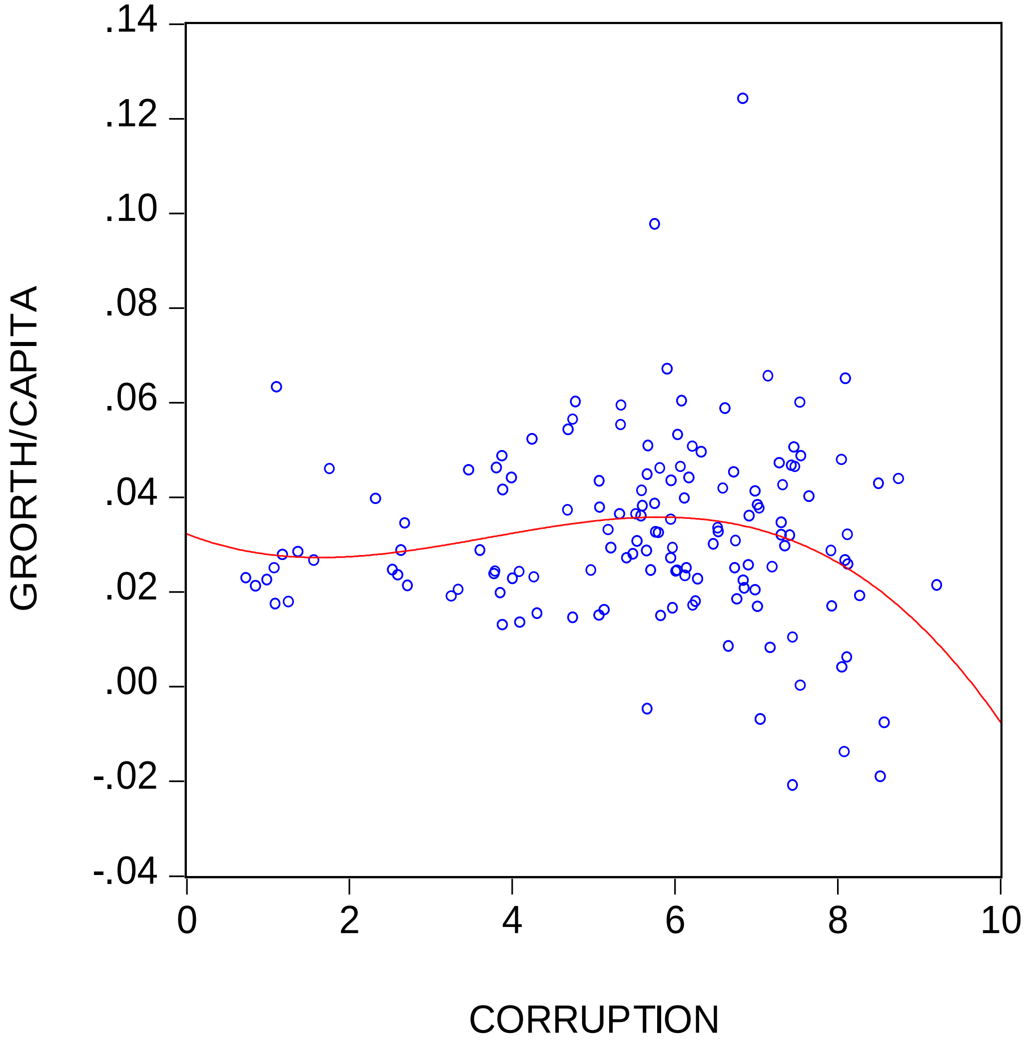

Table 1: Dependent variable: RGDPPCYGR								
	Corruption measured by ICRG index				Corruption measured by CPI index			
	5 year average		Annual		5 year average		Annual	
	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)	OLS (7)	FE (8)
Rgdppcygr(-1)	0.0535 (0.139)	-0.0745* (0.087)	0.2209*** (0.000)	0.1349*** (0.000)	0.1360*** (0.002)	0.0572 (0.350)	0.2635*** (0.000)	0.1717*** (0.000)
Corruption	-0.0314*** (0.000)	-0.0562*** (0.000)	-0.0152*** (0.003)	-0.0242** (0.011)	-0.0128 (0.146)	-0.0538** (0.043)	-0.0073 (0.180)	-0.0201 (0.138)
Corruption-SQ	0.0080*** (0.000)	0.0124*** (0.000)	0.0040*** (0.000)	0.0056*** (0.002)	0.0035* (0.081)	0.0135*** (0.010)	0.0017 (0.166)	0.0047* (0.069)
corruption-CU	-0.0005*** (0.000)	-0.0008*** (0.000)	-0.0003*** (0.000)	-0.0004*** (0.001)	-0.0003* (0.060)	-0.0009*** (0.003)	-0.0001 (0.147)	-0.0003** (0.034)
LnSEC	0.0048* (0.087)	0.0135 (0.163)	0.0017 (0.344)	0.0043 (0.428)	-0.0027 (0.548)	0.0389** ()0.026	-0.0017 (0.637)	0.0187 (0.108)
Grat	-0.0007*** (0.006)	-0.0019*** (0.001)	-0.0005*** (0.002)	-0.0019*** (0.000)	-0.0005 (0.120)	-0.0027** (0.015)	-0.0004 (0.150)	-0.0019*** (0.004)
Open	0.0000 (0.397)	0.0001 (0.372)	0.0000* (0.083)	0.0000 (0.737)	-0.0000 (0.986)	-0.0000 (0.806)	0.0000 (0.853)	-0.0002 (0.112)
Popgr	-0.4736*** (0.000)	-0.7968*** (0.001)	-0.4071*** (0.000)	-0.4019*** (0.000)	-0.8859*** (0.000)	0.7553 (0.225)	-0.8248*** (0.000)	-0.9989*** (0.001)
Irat	0.0017*** (0.000)	0.0022*** (0.000)	0.0009*** (0.000)	0.0010*** (0.000)	0.0011*** (0.001)	0.0000 (0.926)	0.0011*** (0.000)	0.0012*** (0.000)
Democracy	-0.0004 (0.666)	-0.0054* (0.063)	-0.0159 (0.155)	-0.0020 (0.157)	0.0023* (0.084)	-0.0005 (0.926)	0.0031*** (0.001)	-0.0047 (0.137)
Maximum								
Minimum								
R-squared	0.461	0.281	0.595	0.341	0.298	0.049	0.6434	0.427
F-test (*p*-value)	160.84*** (0.000)	10.08*** (0.000)	387.91*** (0.000)	19.92*** (0.000)	78.79*** (0.000)	3.62*** (0.000)	285.52*** (0.000)	12.13*** (0.000)
No. Of countries/observation s	134/476	134/476	133/2505	133/2505	146/311	146/311	128/1206	128/1206

Table 2: Dependent variable: RGDPPCYGR (Using System GMM)										
	Corruption measured by ICRG index						Corruption measured by CPI index			
	5-year average (9)	5-year average (10)	5-year average (11)	Annual (12)	Annual (13)	Annual (14)	5-year average (15)	Annual (16)	Annual (17)	Annual (18)
Rgdppcygr(-1)	-0.0962 (0.252)	-0.0989 (0.243)	-0.0390 (0.425)	0.0965*** (0.001)	0.0912*** (0.001)	0.1012*** (0.000)	0.0020 (0.970)	0.1495** (0.015)	0.1444** (0.015)	0.1421** (0.013)
Corruption	-0.0009 (0.783)	0.0125 (0.352)	-0.0309*** (0.002)	0.0008 (0.639)	0.0044 (0.074)	-0.0296** (0.047)	-0.0927** (0.039)	-0.0019 (0.416)	0.0057 (0.325)	-0.0205* (0.085)
Corruption-SQ		-0.0012 (0.322)	0.0079*** (0.000)		-0.0003 (0.506)	0.0064** (0.021)	0.0185** (0.036)		-0.0006 (0.275)	0.0050* (0.064)
corruption-CU			-0.0005*** (0.000)			-0.0004** (0.015)	-0.0011** (0.027)			-0.0003* (0.061)
LnSEC	0.0137 (0.223)	0.0175 (0.170)	0.0047 (0.116)	0.0208** (0.018)	0.0216** (0.010)	0.0169** (0.039)	0.0732*** (0.000)	0.0142** (0.047)	0.0137* (0.053)	0.0112 (0.149)
Grat	-0.0019** (0.048)	-0.0018* (0.054)	-0.0008** (0.011)	-0.0005 (0.294)	-0.0006 (0.210)	-0.0004 (0.380)	-0.0016 (0.223)	-0.0015** (0.018)	-0.0015** (0.021)	-0.0016** (0.019)
Open	0.0001 (0.587)	-0.0000 (0.928)	-0.0001* (0.069)	0.0002 (0.130)	0.0001 (0.232)	0.0001 (0.150)	-0.0001 (0.636)	0.0001 (0.182)	0.0001 (0.197)	0.0002 (0.127)
Popgr	-0.6252 (0.162)	-0.6159 (0.174)	-0.5511*** (0.000)	-0.2966*** (0.000)	-0.3111*** (0.000)	-0.3226*** (0.000)	-1.8598* (0.089)	-1.2615*** (0.004)	-1.2481*** (0.005)	-1.2260*** (0.005)
Irat	0.0023*** (0.001)	0.0024*** (0.000)	0.0015*** (0.000)	0.0013*** (0.000)	0.0014*** (0.000)	0.0014*** (0.000)	0.0005 (0.503)	0.0014*** (0.000)	0.0014*** (0.000)	0.0013*** (0.000)
Democracy	-0.0148** (0.019)	-0.0159** (0.013)	-0.0004 (0.768)	-0.0042 (0.163)	-0.0037 (0.189)	-0.0040 (0.130)	0.0052 (0.514)	-0.0011 (0.728)	-0.0009 (0.787)	-0.0008 (0.810)
Maximum			6.949			7.293	7.056			6.770
Minimum			2.749			3.363	4.013			2.919
Autocorrell (1) p-values Autocorrell (2)	-2.536 (0.011) -0.696 (0.486)	-2.553 (0.011) -0.471 (0.638)	-3.552 (0.000) -0.170 (0.865)	-18.526 (0.000) 0.725 (0.468)	-19.164 (0.000) 0.569 (0.570)	-19.89 (0.000) 0.661 (0.509)	-3.285 (0.001) N/A	-4.9621 (0.000) -1.136 (0.256)	-5.034 (0.000) -1.134 (0.257)	-5.034 (0.000) -1.1295 (0.259)
Sargan-Statistic (p-value)	Robust	Robust	Robust	1254.964 (0.225)	1353.409 (0.364)	1395.947 (0.748)	31.074 (0.463)	Robust	Robust	Robust
No. of countries/observation	128/336	128/336	131/469	133/2308	133/2308	133/2308	87/165	112/1069	112/1069	112/1069
Wald test (p-value)	50.39 (0.000)	54.52 (0.000)	90.22 (0.000)	84.61 (0.000)	89.67 (0.000)	111.17 (0.000)	93.65 (0.000)	87.54 (0.000)	92.23 (0.000)	84.97 (0.000)

Note: For 5-year average all the three equations (using ICRG corruption index) are passed the sargan test-we report p-values corrected using robust standard errors therefore the Sargan tests are not reported. The results are similar using CPI corruption index, but the Sargen test are not passed therefore are not reported, but the results are available upon request. To do system GMM for any series requires at least three consecutive observations and the corruption data for CPI are not available for longer series especially when averaged for 5-year (Egger and Merlo 2007, pp1538).

Table 3: Country list								
Below 3.5		**3.5-7.5**			**Above 7.5**			
Denmark	Uruguay	Dominica	Namibia	Burkina Faso	Gabon	Uganda	Sudan	Myanmar
Finland	Israel	Estonia	Samoa	Sri Lanka	India	Kyrgyz Republic	Serbia	Bangladesh
New Zealand	Belgium	Oman	Poland	Panama	Mali	Ukraine	Angola	Turkmenistan
Iceland	Portugal	Cyprus	Cuba	Mexico	Syria	Nepal	Cambodia	Somalia
Sweden	Spain	Slovenia	Tunisia	Colombia	Bolivia	Nicaragua	Congo, Rep.	
Singapore		Botswana	Jordan	Thailand	Djibouti	Gambia, The	Guinea-Bissau	
Netherlands		Taiwan	Croatia	Lesotho	Mongolia	Venezuela, RB	Macedonia, FYR	
Canada		Saudi Arabia	Latvia	China	Niger	Russian Federation	Uzbekistan	
Switzerland		Brunei Darussalam	Algeria	Madagascar	Solomon Islands	Vietnam	Georgia	
Norway		Mauritius	Peru	Senegal	Zambia	Ecuador	Burundi	
Australia		Macao SAR, China	Morocco	Rwanda	Egypt, Arab Rep.	Tanzania	Belarus	
United Kingdom		Kuwait	Malta	Armenia	Sao Tome and Principe	Cameroon	Equatorial Guinea	
Luxembourg		Bahrain	Ghana	Argentina	Togo	Paraguay	Kazakhstan	
Germany		Costa Rica	Lithuania	Vanuatu	Philippines	Pakistan	Guinea	
Austria		Cape Verde	Guatemala	Jamaica	Tonga	Indonesia	Iran	
Hong Kong		Malaysia	Slovak Republic	Malawi	Maldives	Kenya	Nigeria	
Ireland		Hungary	Turkey	Romania	Mauritania	Moldova	Albania	
United States		South Africa	El Salvador	Dominican Republic	Eritrea	Sierra Leone	Haiti	
United Arab Emirates		Seychelles	Montenegro		Guyana	Papua New Guinea	Congo, Dem. Rep.	
Qatar		Italy	Brazil		Cote d'Ivoire	Yemen, Rep.	Tajikistan	
Chile		Korea, Dem. Rep.	Swaziland		Honduras	Central African Republic	Afghanistan	
Japan		Czech Republic	Trinidad and Tobago		Libya	Lao PDR	Iraq	
France		Greece	Bulgaria		Mozambique	Zimbabwe	Myanmar	

Table 4: Dependent variable: annual growth rate per capita (Using System GMM)

	Corruption measured by ICRG index			Corruption measured by CPI index		
	Corrp (≤ 3.5) (19)	Corrp (3.5 *to* 7.5) (20)	Corrp (*above* 7.5) (21)	Corrp (≤ 3.5) (22)	Corrp (3.5 *to* 7.5) (23)	Corrp (*above* 7.5) (24)
Rgdppcygr(-1)	0.199** (0.011)	0.0553 (0.943)	-0.1129 (0.275)	1.3281*** (0.000)	2.122*** (0.000)	0.1203 (0.332)
Corruption	-0.0056 (0.202)	0.2405** (0.047)	-0.0771*** (0.004)	-0.1050*** (0.000)	0.1053* (0.076)	-0.0125** (0.047)
Wald Chi-square (p-value)	9.08 (0.011)	3.91 (0.141)	8.49 (0.014)	27.58 (0.000)	19.84 (0.000)	8.11 (0.017)
Sargan-Statistic (p-value)	260.206 (0.000)	12.373 (0.135)	76.403 (0.137)	17.087 (0.584)	10.040 (0.691)	59.911 (0.992)
Autocorrell (1) (p-value)	-6.096 (0.000)	0.076 (0.939)	-5.088 (0.000)	-4.091 (0.000)	-4.046 (0.000)	-4.985 (0.000)
Auto Correlation (2) (p-value)	1.165 (0.244)	-0.097 (0.922)	0.273 (0.785)	1.278 (0.201)	1.345 (0.179)	1.086 (0.278)
No. of countries/observations	26/618	53/1163	61/476	28/379	52/522	61/476