Economic Growth and Corruption:
Evidence from Panel Data

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Abstract

Corruption has been found to be one of the most retarding factors of growth in many parts of the world. It is a common phenomenon today in many developing countries and it arises from their poverty and rent seeking activities among the government officials. Economists view corruption-underdevelopment interaction as resulting from two effects: distortionary effects and disincentive effects. The present study compares the empirical results of corruption development interaction from two models. One is the usual linear regression model that arrives at the conclusion that economic development or per capita GDP significantly depends on level of corruption and per capita investment expenditure of the country concerned. The other is a fixed factor model that tries to eliminate the country specific effects that may be influential in affecting per capita GDP growth. Contrary to the first simple OLS model in the second differenced model there is no significant direct relationship between corruption and economic development while investment still remains a significant variable in affecting economic development. This somewhat contradictory result is reconciled by the observation that empirically corruption and investment have been found to be highly correlated variables but the first differences of these two variables are not so. Hence the second model's insignificant result implies that the first model's significant result arises from the fact that corruption reduces investment and this in turn hampers economic growth. These two effects are not well separated in the first model.

1. INTRODUCTION

By corruption we usually mean the dishonest or preferential use of power or position that has the result of one person being advantaged over another. The

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definition of corruption varies according to the areas where it is being used. E.g., from a public official's point of view it may indicate bribery, obtaining secret offering or secret concession, from private point of view it may mean tax evasion, forgery, fraud, get admission in schools without passing the qualifying test, etc. So it is difficult to give a single definition of corruption and we should define the term in accordance with our area of investigation. Corruption is also difficult to measure since it often occurs in clandestine. There have been several attempts at measuring and comparing corruption internationally. According to World Bank's 1996 estimate New Zealand, Denmark, and Sweden lie near the clear end of the scale while Kenya, Pakistan and Nigeria are situated near the most corrupt end of the scale. An organization named Transparency International publishes an index of corruption ranging from 1 (most corrupt) to 10 (cleanest). According to its 1998 rankings the cleanest country in the world was Denmark (scoring a perfect 10) and the most corrupt was Cameroon (scoring a dismal 1.4). Incidentally the score for the United States was 7.5, and for Japan it was 5.8.

This paper aims at identifying the growth corruption linkage from a sample of 38 countries over the period 1996 to 1998. The selection of the countries and years are based on the availability of data. Some key factors of economic corruption, its consequences for economic development are also discussed and finally some policy recommendations have been made. The data used in this study were collected mainly from two sources depending on the nature of the data. For corruption index, I resorted to Tanzi (1998) published by the IMF and the remaining data like investments, GDP, population, and exchange rates were extracted from International Financial Statistic (IFS) CD Rom (Year 2000), also published by the IMF.

2.   THE ECONOMICS OF CORRUPTION

Like any other market corruption is also based on contracts between different interests. Firms, pressure groups, or citizen try to maximize their gain by paying bribes, while public officials try to maximize their illegal earnings and politicians their power and wealth (Bresson 2002). Bribe payers may seek to reduce or avoid costs by not paying tax or fines. Bribe can also be paid to get government services ahead of time as happens in getting telephone connections. All parties involved impute their costs and benefits associated with the corrupt activities. Bribers' costs are the extra money income they have to pay to obtain the service and their benefit is obtaining the service without hassle or delay. On the other hand public officials' cost of involving in corruption is the possibility of being caught and fired from the job and the gain is the extra income they receive from corruption.

Both parties assess their respective costs and benefits marginally and participate the corruption game as long as their benefit exceeds costs at the margin. Now the question naturally arise what will be the corruption fee (price) charged for each unit of corrupt activity. Since there is absence of competitions in the supply of corrupted commodities or services, the price is determined through some kind of bilateral monopoly or monopoly (where there is one service provider and numerous customers interested to obtain the service) market mechanism. The gain from exchange is shared according to the bargaining power of the service providers and that of service takers in case of bilateral monopoly.

3.   GROWTH-CORRUPTION INTERACTION

Developing country governments heavily restrict economic activities in almost every sphere of life including tax, capital control, and exchange rate management to achieve various policy objectives. Economic agents who are best known as personal benefit maximizer, rather than social gain maximizer, attempt to evade these rules and regulations, if they find it to their advantage, through corrupt practices such as bribery and extortion. Sometime it is argued that development of underground economic activity has in some instance aided economic efficiency by replacing command based resource allocation with a degree of market-based solution. The proponents of the positive growth corruption relation put forward that firms and individuals avoid burdensome regulations and ineffective legal systems by resorting to corruption. On the other hand opponents of the above view often presents data showing that corruption and poverty go hand in hand. For
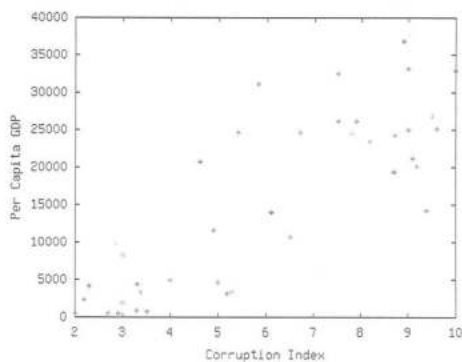

Figure 1: Corruption index and per capita GDP in 1998

a large sample of developing and industrial countries figure 1 shows a strong positive relationship between annual real per capita GDP and an index of corruption (note that a higher index means a relatively lower corruption). But this type of simple result from a cross section of data should be taken with a grain of salt. The degree of corruption to a large extent is determined by social settings, consciousness among the citizens and attitude towards corruption. Some country specific or fixed effect (e.g. amount of effort exerted in the workplace, weather condition, productivity, etc) may be influential in determining the level of development. To get a meaningful picture of corruption development interaction, we need first to remove fixed country effects and second control for other variables that may explain growth.

4.   FIXED EFFECT MODEL

To deal with the first problem we collect data on per capita GDP and corruption index for a number of countries over two years. The corruption data are from Tanzi (1998) and the per capita GDP data have been taken from the International Financial Statistics (2003) CD Rom. The data are for the year 1996 and 1998. The data for these two separate years are then differenced to get rid of the fixed country effects. To see how this works let i denote cross sectional unit and t the time period. The model with single observed and unobserved variables can be written as

$$y_{it} = \beta_0 + \delta_0 d_t + \beta_1 x_{it} + a_i + u_{it} \quad ; i=1,2 \text{———————(1)}$$

where y_{it} denotes per capita GDP and x_{it} is the corruption index of country i at period t and a_i captures all unobserved, time constant factors that affect y_{it}. d_t is a dummy variable that takes the value 1 in period 1998 and 0 in 1996. Since a_i is constant over time it is dropped when we difference the data over the two periods. Differencing (1) for each observation i across the years 1998 and 1996 we get

$$y_{i(98)} - y_{i(96)} = \delta_0 + \beta_1 (x_{i,98} - x_{i,96}) + (u_{i,98} - u_{i,96})$$

$$\text{or} \quad \Delta y_i = \delta_0 + \beta_1 \Delta x_i + \Delta u_i \text{ ——————————(2)}$$

where Δ denotes the changes in the relevant variables from t=1996 to t=1998. Coefficient of δ_t (i.e. d_0) allows the intercept in equation (1) to change over the two periods. The unobserved effect a_i has been differenced away in equation (2).

The intercept δ_0 in equation (2) accounts for the change in intercept from 1996 to 1998. Now assuming Δu_i and Δx_i are uncorrelated and the later has sufficient variation in it, OLS estimate of β_1 will be unbiased and statistical inference about it will be valid. Since per head amount of investment is also an important time varying factor that affects per capita GDP growth, differencing does not resolve the omitted variable problem. So per capita investment in first differenced form is used an additional variable while estimating equation (2). The estimated model thus obtained is:

$$\Delta pgdp = -518.64 -75.031\ \Delta cor +2.5262\ \Delta inv \ ————————(4)$$

s.e.   (200.9)   (211.43)   (0.31007)

t-ratio (-2.5816) (-0.3549)   (8.1471)

p-value (0.0142) (0.7248)   (0.0000)

R^2=0.6998   DW=1.63   d.f.=35   F-value = 40.795

Thus when country specific effects are removed by differencing, corruption looses its significance in affecting per capita change in income. On the other hand investment remains a significant variable in explaining change in income. The estimated intercept in equation (4) (which is in fact the slope of the dummy if the variables in the equation were in level form) implies that over the period 1996 to 1998 world per capita GDP has shown a secular decline of about –518.64 dollars, i.e. if we fit two separate cross section regressions for the same sample of countries, one for the period 1996 and the other for the period 1998 we would experience a –518.56 unit of downward shift in the later regression. The coefficient of Äinv shows that for each unit increase in per capita investment expenditure, per capita income grows by about two and a half dollars. The estimated coefficient is highly significant too with a p value of zero. On the other hand the coefficient of Äcor is insignificant implying that corruption is not a significant factor in economic development. This later conclusion seems to run contrary to the popular belief that corruption is inimical to growth. To get a clear picture of why get here such a result let us estimate the above model again with all the variables in level form, i.e. we are in fact estimating model (1) now. The estimated model is

$$pgdp =\ 6665.2 - 92.903\ cor + 3.4895\ inv \ ——————————(5)$$

s.e.   (2158.3) (0.4200) (30.692)

t-ratio (3.0881)   (8.3082) (-3.0269)

p-value (0.0039) (0.0000) (0.0046)

R^2=0.9071   DW = 1.2643 d.f. = 35 F-value =341.34

In equation (5) both the corruption and the per capita investment are highly significant variables in affecting per capita GDP. The problem with the estimated equation (5), however, is that corruption and per capita investment can interact with each other and the effect on per capita income of these two variables may not be separable. The correlation matrix for equation (4) and (5) in Table 1 below shows that correlation and per capita investment are in fact highly correlated for equation (5). This correlation problem is less severe for equation (4) i.e. for the differenced form model. So the differenced form model is more appropriate in separating the effect of correlation and per capita investment on per capita GDP.

Table 1: Correlation Matrix

Equation (4)		Δcorruption	Δinvestment
	Δcorruption	1.0000	-0.3803
	Δinvestment	-0.3803	1.0000
Equation (5)		corruption	investment
	corruption	1.0000	0.8249
	investment	0.8249	1.0000

Source: Calculated by the author using SHAZAM

Inspection of these two results suggests us that the alleged corruption-poverty interaction is in fact occurring through the pernicious effect of corruption on investment.

Corruption not only reduces investment, it at the same time suppresses business activities and makes the economy function less efficiently. Financial Times (1999) points out clearly the economic inefficiencies associated with corruption. In Brazil which has 4.0 score in the corruption scale, bureaucrats and public officials at the municipal, state and federal levels make such intricate laws, regulations, decrees and directives that it is quite difficult for a businessman to fully comply with. They either pay fines or bribes to evade laws. The bribes and fines make up part of what is known as Brazil Cost, that inflate the cost of conducting business in Brazil.

Corruption affects the quality of public expenditure, which in turn impedes growth. Large investment projects are taken through the decision of some high level public officials who are frequently affected by the incumbent political leaders. These projects are carried out to provide opportunities to some individuals or political groups to get commissions from those who are to execute the projects. These projects are inferior to some other good projects on the basis of investment selection criteria like cost benefit analysis. Thus distorted projects are chosen and productivity of public expenditures reduced. Efficiency of government expenditure is also low when they are procuring something. Complex and costly procedures for collecting goods and services sharply increase the prices at which they are purchased.

5.   LOW WAGE AND CORRUPTION

It is often argued that low public sector wage is associated with high level of corruption in the public sector in developing countries (Tanzi, 1998). To explain the interaction between low wage and corruption let us first differentiate between corruption due to need and corruption due to greed. The later type of corruption occurs irrespective of the wage level. In aggregate it may be determined by existing values and customs among the population toward corruption or by the amount of consciousness among the masses against corruption. The former part, corruption because of need, can be systematically related to the wage level. Figure 2 elucidates the relation where OA is the minimum amount of income needed to maintain a decent or socially acceptable life and OC is the amount of corruption
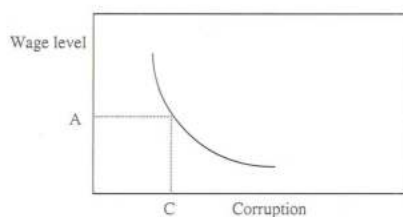

Figure 2: Corruption-wage tradeoff curve. Source: Tanzi (1998).

that will anyway happen. If government decreases wage level below OA corruption will increase. But reducing corruption below OC requires sharp increase in the wage level. Even corruption is minimally fixed at OC by greed when wage level increases too high the cost of involving in corruption and thereby increase the possibility of loosing more from getting discharged from the highly paid job if caught of corruption. This may explain why the corruption-wage tradeoff curve still slopes negatively above the OA wage level.

This type of relationship has been tested by Rijckeghem and Weder (1997) and Haque and Sahay (1996). Using cross section data they have been able to found a statistically significant relationship between corruption and wage level. They also found the existence of minimal level of corruption in their studies. High wage in the public sector attracts more able, productive, and honest individuals. Since corruption cannot be root out solely with a high level of wage, wage increase should be accompanied by other measures.

6.   CORRUPTION RISK FACTORS

Different intensities of corruption across different areas and sectors suggest that some factors are responsible for different level of corruption. In the early stages it is not difficult to identify them but as corruption becomes rooted in the economy e.g. it becomes systematic it becomes hard to identify and root out corruption then turns into a formidable task. The entrenched nature of systematic corruption requires bold action during the anti-corruption campaign.

Most of corruption cases arise from the rent seeking activities and government intervention in the economy. Economic rent is created when supply falls short of demand. We do not have to do much about rent seeking activities that arise out of natural limitation of supply. But if rent-seeking behavior arises from artificial limitations of supply we begin to feel alarmed about the emergence of corruption. Government interventions in the area of trade control are notorious for creating corruption. Government restrictions on import through import quota create rent for import license holder. To get the lucrative import license interested parties bribe the government officials. In case of tariffs, producers try to influence the political leaders to impose tariff on imported commodities that they produce.

Low wages of public employees relative to their private counterpart often lead to corrupt activities among the government officials. Government officials often use their power and position and take bribe to match their income with the private sector income. The risk of corruption is high if the cost of living far exceeds the income level and the cost of being caught is being low. One might think that

corruption can be abolished through the liquidation or demise of the state. But a civilized society cannot function without a state. Moreover in some of the clean countries in the world like Canada, Denmark, Finland, Sweden and the Netherlands have larger government size than some of most corrupt countries in the world. As Tanzi (1995) notes the way state operates and carries out operations is far more important than sheer government size in determining the level of corruption. If government activities involve a lot of regulations and authorizations, which requires frequent contact between citizens and bureaucrats and requires enormous amount of time dealing with public officials, people may be forced to bribe officials to reduce the cost of their obtaining the service. Taxation based on clear laws and not requiring contacts between taxpayers and tax inspectors are much less likely to produce act of corruption.

Government expenditure through extra budgetary accounts lacks transparency and often leads to corruption. Extra budgetary accounts may be set up for specific purposes like pension funds, road funds, etc. It may also be established to reduce political and administrative controls that are likely to accompany budgetary expenditure. Money received from foreign aid or selling natural resources is channeled to special accounts that tend to be less transparent and often a big portion of it end up in illegal pockets.

Sociological factors like ethnic background and family ties often contribute to corruption. There is strong tendency among public officials of developing countries to give undue advantage in the provision of services. In many countries public officials have power to take discretionary decisions as to provide tax incentive against income taxes, use of government owned land, sale of state owned assets or public enterprises. These decisions involve tremendous gain to the party involved. To get favorable decisions sometimes bribes are offered and in other cases personal relation with the public relation do the work.

7.   EFFECTS OF CORRUPTION

We can divide the effects of corruption on the economy into two parts:

- Effects on the allocation of resources: Corruption redirects the ongoing economic activity and makes them less efficient. This has adverse effect on economic growth. Corruption impedes long-term foreign and domestic investment, suppresses entrepreneurship, and misallocates talents to rent-seeking activities. In a corrupt society politicians and bureaucrats imposes excessive and discretionary regulations on entrepreneurs. Mauro (1995) studied the effects of corruption on growth. In his regression relevant to

corruption Mauro finds that both the individual corruption and the bureaucratic efficiency index are statistically significant determinants of the average level of investment over the period 1960-1985 even when controlling for other determinants of investment. A one standard deviation improvement of corruption index is associated with a 3.3 percent GDP increase.

- Disincentive Effects: Bribery or corruption increases transaction costs and uncertainty in an economy. Genuine investors see the return to their investment reduced in a corrupt society. As a result some prospective investors may not come forward with their investment packages. This may have negative multiplier effects on the economy. Sometime it may be the case that projects are allocated to the contractors on the basis of corruption and the efficient contractors who do not get the contract because of corruption may feel disheartened and withdraw themselves from their activity in the economy.

8.   POLICIES FOR COMBATING CORRUPTION

Since corruption emerge from both the demand and supply side it should be tackled also in these two fronts. On the demand side measures are taken to reduce the price differences of obtaining the same commodity through legal and illegal ways. Reducing import duty and deregulation measures can reduce the incentive for obtaining imports through illegal ways. In the long run charging citizens with moral values through religious or moral teaching can substantially reduce corruption from both demand and supply sides.

We have seen that an important factor behind corruption is the existence or creation of economic rent. So to reduce corruption competition of should be increased from the supply side. When more than one government authority can issue the same license, competition among different officials will drive the bribe price to zero (Ackerman 1999) because from the officials point of view producing bribe taking behavior is essentially costless. Raising the cost of involving in the corrupt activities can also reduce corruption from the supply side. Strict vigilance leading to frequent detection and punishment, reallocation of duties within the organization can reduce corruption from the supply side (Dey 2002).

Sometimes corruption occurs due to asymmetric information. The principle at the top level of government does not have the same level of information as the agent of a government official designated to carry out a specific task has. The extent of accountability and transparency should be increased to reduce corruption. Shortening the hierarchical control structure can also reduce the asymmetric information problem.

9. CONCLUSION

Corruption is itself a vast idea with its many faces. Corruption may be social, political, economical, and ethical or any other form involving deviation from the accepted practice. When corruption becomes widespread it is difficult to root it out. In many developing countries corruption is associated with the way government operates. Thus to reduce corruption state machinery should be reformed in the right manner. Rules and regulations based system should be substituted by incentive mechanism and government policies should be as transparent as possible. Increasing public sector wages can be one method of creating incentive for the honest public officials. Since corruption is multifaceted, when government is thinking of reducing of corruption it need consider a package of policies rather than a single measure.

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Appendix A
Data Set for Corruption Growth Interaction Study

Country	Corruption Index 96	Corruption Index 98	Total Investment in year 96	Total Investment in year 98	Total Population in year 96	Total Population in year 98	Exchange rate 96	Exchange rate 98	GDP in year 96	GDP in year 98
Argentina	3.41	3	49211	59595	35.22	36.12	1	1	7727.14	8276.52
Australia	8.6	8.7	116248	135624	18.31	18.73	1.28	1.59	22250.05	19423.99
Austria	7.59	7.5	571198	615098	8.06	8.08	10.59	12.38	28703.05	26138.65
Belgium	6.84	5.4	1661000	1875000	10.16	10.21	30.96	36.3	26567.81	24585.63
Brazil	2.96	4	150050	179982	157.87	161.79	1.01	1.16	4884.88	4871.09
Canada	8.96	9.2	142657	174082	29.67	30.25	1.36	1.48	20666.55	20143.18
China	2.43	3.5	2333610	2818080	1232.46	1255.7	8.31	8.28	667.18	768.03
Colombia	2.73	2.2	21749500	26453200	39.3	40.83	1036.69	1426.04	2471.93	2420.82
Denmark	9.33	10	198400	240971	5.26	5.3	5.8	6.7	34774.16	32920.3
Finland	9.05	9.6	99726	128913	5.12	5.15	4.59	5.34	24929.79	25072.54
France	6.96	6.7	1470400	1578100	58.37	58.85	5.12	5.9	26618.98	24665.99
Germany	8.27	7.9	779360	804900	81.9	82.02	1.5	1.76	29190.07	26115.3
Greece	5.01	4.9	5828100	7615100	10.48	10.52	240.71	295.53	11866.57	11592.95
Hong Kong	7.01	7.8	372327	381079	6.48	6.64	7.73	7.75	23794.78	24471.63
Hungary	4.86	5	1475540	2384610	10.19	10.11	152.65	214.4	4431.96	4653.75
India	2.63	2.9	3118700	3732100	939.54	970.93	35.43	41.26	411.02	438.91
Indonesia	2.65	2	1.58E+08	2.43E+08	196.81	204.42	2342.3	10013.6	1155.28	466.91
Ireland	8.45	8.2	8512	13275	3.63	3.7	0.63	0.7	19954.52	23390.73
Italy	3.42	4.6	3.49E+08	3.85E+08	57.38	57.51	1542.95	1736.21	21486.32	20805.03
Japan	7.05	5.8	1.45E+08	1.39E+08	125.76	126.41	108.78	130.91	37338.86	31171.42
Malaysia	5.32	5.3	107825	76275	21.17	22.18	2.52	3.92	4756.13	3271.86
Mexico	3.3	3.3	451081	804002	92.72	95.82	7.6	9.14	3590.2	4393.97

Country	Corruption Index 96	Corruption Index 98	Total Investment in year 96	Total Investment in year 98	Total Population in year 96	Total Population in year 98	Exchange rate 96	Exchange rate 98	GDP in year 96	GDP in year 98
Netherlands	8.71	9	131646	149879	15.53	15.71	1.69	1.98	26453.86	24952.26
New Zealand	9.43	9.4	21110	19972	3.71	3.79	1.45	1.87	18014.69	14198.21
Norway	8.87	9	216217	276925	4.38	4.43	6.45	7.55	35984.21	33167.9
Pakistan	1	2.7	368100	402800	134.15	131.51	35.91	44.94	440.12	453.07
Philippines	2.69	3.3	508745	563636	71.9	75.15	26.22	40.89	1152.08	870.22
Portugal	6.53	6.5	4005100	4992100	9.93	9.97	154.24	180.1	10974.58	10718.27
Singapore	8.8	9.1	49171	51352	3.67	3.92	1.41	1.67	24876.22	21161.1
South Africa	5.68	5.2	99381	125877	40.34	42.13	4.3	5.53	3565.14	3156.96
Spain	4.31	6.1	14975700	19800200	39.27	39.37	126.66	149.4	14825.94	14051.7
Sweden	9.08	9.5	276265	298961	8.84	8.85	6.71	7.95	29610.02	26865.65
Switzerland	8.76	8.9	73884	76017.3	7.07	7.11	1.24	1.45	41443.86	36022.12
Thailand	3.33	3	1886100	1028250	60	61.16	25.34	41.36	3040.54	1829.72
Turkey	3.54	3.4	3.71E+09	1.28E+10	61.53	63.39	81404.9	260724	2949.2	3238.46
UK	8.44	8.7	125604	151969	58.8	59.24	0.64	0.6	20254.3	24190.02
USA	7.66	7.5	1212100	1472900	265.46	270.56	1	1	29432.68	32488.91
Venezuela	2.5	2.3	4645760	9991300	22.31	23.44	417.33	547.56	3161.73	4089.08

(Note: 1. Population is in million

2. Exchange Rate is expressed as amount of Domestic Currency per U.S. Dollar

3. Investment is in local currency. It was converted to per capita U.S. dollar using the exchange rate and population data.

4. GDP are in local currency and was converted to U.S. dollars and in per capita terms

Source: Tanzi (1998) for column one and three, IFS CD Rom (2000) for the remaining columns.