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A Statistical Analysis of Public Sector Corruption and Economic Growth

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Abstract

This study reports on the results of a statistical analysis in which the relationship between the independent variable of corruption, as measured by the World Bank, and the dependent variable of economic growth, as measured by percentage of GDP growth per year, was examined. The purpose of this study is to apply empirical methods to the debate on corruption and growth, in which neoclassical theory predicts that corruption retards growth but in which other models, such as Lewis growth and the Kuznets Curve, suggest that corruption may actually speed up growth in underdeveloped countries. The main finding of the study is that there is in fact a positive correlation between corruption and GDP growth for ten randomly-chosen countries evaluated from 1999-2010. Further research is recommended as a means of determining the relationship between corruption and growth in both mature and immature economies.

Keywords: Economic growth, corruption, Kuznets Curve, Lewis growth, neoclassical theories of economic growth.

In neoclassical economic theory, the existence of corruption creates problems for the functioning of the free market, and, in theory, creates impediments to economic growth. Neoclassical economic theorists have taken numerous approaches to describe the connection between corruption and market efficiency. Many of these approaches have focused on specific problems of information. For example, Winfield, Bishop, and Porter (2004) argued that, in corrupt economies, workers were less likely to know about available jobs and employers were less likely to know about the quantity of quality available, thus leading to higher employment. Behind all such explanations is a larger theoretical infrastructure. As Ingham (2008) argued, markets function according to "the interaction of supply and demand that represents the decisions of myriad otherwise unconnected individuals."[1] . Economies grow to the extent that these collective decisions are correct. As Hayek (1945) explained the matter,

> The economic problem of society is thus not merely a problem of how to allocate "given" resources...It is rather a problem of how to secure the best use of

[1] Ingham, G. (2008). *Capitalism, p. 9.*

> resources known to any of the members of society...it is a problem of the utilization of knowledge not given to anyone in its totality.[2]

What happens in a state of corruption is that what Hayek (1945) refers to as resources beingstymied by a lower quality of information, or sometimes no information at all. Thus, in a corrupt country, a government with media control might promote the stock of a company that is actually highly inefficient, but whose CEO is related to the Prime Minister of the government. There are, of course, innumerable possible examples of how exactly corruption might chip away at the efficiency of decision-making. The purpose of this paper is not to examine these kinds of theoretical cases or to engage directly with the theory of market efficiency, but to conduct an empirical test to determine the nature of the relationship between economic growth and corruption. The theory of neoclassical economics leads one to expect that the relationship will be negative; that, in other words, high corruption will predict low growth. It is surely worthwhile to determine whether empirical analysis supports this expectation.

Purpose of the Study

The purpose of the study is to apply quantitative methods to the exploration of the relationship, if any, between the variables of public sector corruption (as a proxy for politico-economic corruption in general) and economic growth, with the larger purpose of examining neoclassical theoretical claims that corruption is a brake on growth.

Research Questions and Hypotheses

The following research questions and hypotheses will guide the study:

Research Question 1: Can corruption be held to be the principal component for the following World Bank (2011) dimensions: Government effectiveness, regulatory quality, control of corruption, and rule of law?

H_{01}: No, there will be more than one component in any factor reduction of the specified dimensions.

H_{1A}: Yes, there will be exactly one component in any factor reduction of the specified dimensions.

Research Question 2: In a time series regression model, how well do the World Bank (2011) dimensions of corruption—government effectiveness, regulatory quality, control of corruption, and rule of law—predict the GDP growth of 10 randomly-selected countries treated as a single sample?

[2] Hayek, F.A. (1945). *The use of knowledge in society, p. 520.*

H_{02}: The regression will not be significant.
H_{2A}: The regression will be significant.

Literature Review

There are two main concepts in this study: (a) economic growth; and (b) corruption, particularly insofar as it has economic impacts. Each of these concepts will be explored separately in the literature review. The final section will summarize lessons learned.

Theories of Economic Growth

Why do economies grow? There are two complementary answers to this question, as provided by neoclassical scholars. The first answer is more theoretical and depends for its explanatory power on more abstract concepts of market operation. The second answer is more functional and marshals evidence from policy, history, and technology to make its points.

Ingham (2008) provided a brilliantly concise overview of Adam Smith's definition of the market, as follows: "the interaction of supply and demand that represents the decisions of myriad otherwise unconnected individuals."[5] Again, it is the individual who is coded as being at the center of the market. What does this formulation mean, and how is it helpful in answering the question of how markets work? First, it not just any individual that is at the center of the market, but what, according to Smith, is called *homo economicus*. For Smith (1801), *homo economicus* is a profit-maximizing individual[6] , who participates in the marketplace solely in order to maximize his or her economic position. This concept of the economic individual is radically different from that of, say, Aquinas (1259), who argued that the goal of participation in markets was not to accumulate profits, but to obtain a base level of subsistence[7] , akin to what Gudeman (2001) has called a "pure trade" .[8] Indeed, to Aquinas, participation in business for solely profit-oriented ends was a mortal sin .[9] Therefore, *homo economicus* is a relatively new phenomenon. Before the eighteenth century and Smith's (1801) popularization of the notion of profit-seeking as the core of economic activity, many people participated in the economy with purposes inimical to those of the market.

The notion of *homo economicus* is thus at the basis of methodological individualism as understood in economics. It is to the notion of *homo economicus* that Mises (1963) refers when he argues that "Monetary calculation is the main vehicle of planning and acting in the social setting of a society of free enterprise directed and controlled by the market and its prices."[10] It is by the cumulative actions of the self-interested, calculating, deciding individual agent (in a phrase, *homo economicus*) that the market is formed. This fact, and all of its implications, must

[5] Ingham, G. (2008). *Capitalism, p. 9*
[6] Smith, A. (1801). *The wealth of nations, p. 30*
[7] Aquinas. (1259). *The gospel of stewardship*, p. 31
[8] Gudeman, S. (2001). *The anthropology of economy: Community, market, and culture, p. 98*
[9] Aquinas. (1259). *The gospel of stewardship*, p. 31.
[10] Mises, L.V. (1963). *Human action, p. 230.*

be understood and acknowledged as the foundation of all further analysis of the mechanisms of the market.

In order to understand how markets work, it is necessary to begin from the assumption that a market is but the emergent condition from the collective activities of *homo economicus*. However, as Mises (1963) astutely pointed out, *homo economicus* does not exist in a vacuum; s/he requires "the social setting of a society of free enterprise."[11] In other words, markets require *homo economicus* to function, but *homo economicus* also requires certain pre-existing conditions, rules, and settings in which to carry out economic activity. It is only via this mutual dependency that the market society emerges (Read, 1958).

There are numerous implications for corruption that emerge from these theoretical viewpoints. First, corruption is clearly a form of interference with what Mises (1963) called monetary calculation and what Hayek (1945) called the utilization of knowledge. Corruption, in so far as it circulates lies (and, in some cases, also suppresses the truth) about economic matters, promotes a lower quality of individual decision-making, which in neoclassical theory should lead directly to market inefficiency and thence to lower rates of economic growth. However, in practice, this kind of causal chain has also been called into question.

For example, Lewis (1954) argued that economic growth was not the natural outcome of methodological individualism as practiced in an open and non-corrupt market, but simply the transfer of surplus labor from agriculture to manufacturing (and, later, to services): "The key to the process is the use which is made of the capitalist surplus. Insofar as this is reinvested in creating new capital, the capitalist sector expands, taking more people into capitalist employment out of the subsistence sector."[12] Technically, good use can be made of the capitalist surplus even in an environment of corruption. Consider China, where growth has been powered by: (a) The availability of a large labor pool with enough technical sophistication to run machines; (b) the increased flow of capital from the rest of the world to China, which in turn speeds up the growth of Chinese manufacturing; and (c) government policies that accelerate manufacturing, for example by keeping down the value of the Chinese currency relative to its export targets. Graham (2000) has argued that, in China, South Korea, and Japan, corruption has been an active part of policy, used particularly to route more business to larger corporations, but that this corruption has actually spurred rather than retarded growth. The same point has been made by Kang (2007) for the Chinese context.

Considering Corruption More Closely

Even if one grants the close connection between corruption and high economic growth as it has historically manifested itself in East Asia (Bergsten, Freeman, Lardy, & Mitchell, 2009), the countries examined in this study are neither East Asian countries nor export/manufacturing powers. Some other theory is therefore required to examine the connection between corruption and economic growth.

The Kuznets Curve is a good possible explanation for why corruption and economic growth might go together even in countries without manufacturing competence and a sort of

[11] Mises, L.V. (1963). *Human action, p. 230.*
[12] Lewis, S.A. (1954). *Economic development with unlimited supplies of labour*, p 151-152.

embedded corruption in the policy layer, as in East Asia. The Kuznets Curve is a graphical representation of how income inequality first rises as incomes per capita also rise; however, at a certain point, inequality will begin to fall as income per capita also keeps on rising (Krugman & Wells, 2009). There are a number of possible explanations for why the Kuznets Curve takes the shape that it does. First, when an economy is underdeveloped, both income inequality and per capita income are low. An underdeveloped economy will not have extensive capital flows, resulting in more income equality; as an economy first develops, most of the fruits go to the people who are able to make capital investments. At this point, for example, the wealthy could become far wealthier by hiring rural labor to work for very cheap prices in urban manufacturing settings. However, as per capita income keeps rising, more and more rural workers will become plugged into the developing economy and will be able to unionize and demand higher wages. Additionally, capital flows will generate better education and other opportunities that allow people other than the very wealthy to also benefit from the general trend of economic development.

With this background in mind, imagine the case of a newly industrializing country. Such a country, according to the theory implicit in the Kuznets Curve, will actually thrive on corruption, as corruption can make it easier and faster to plug new agricultural workers into a non-industrial context. Corruption can also make it easier to keep these new workers from unionizing and demanding higher wages. Finally, as in South Korea in the 1980s, corruption can also assist the economy as a whole by driving it towards sectors in which it has competitive advantage (Heo & Roehrig, 2010), even if doing so limits the freedom of individual participants in the economy.

On further examination, then, there is no good reason to uncritically accept the implication inherent in neoclassical theory that corruption retards growth by chipping away at the quality of information available in a market. Even if corruption does have this effect on markets, it also seems to help underdeveloped countries get on the right side of the Kuznets Curve and of Lewis (1954) growth. It is for this reason that empirical investigations are important, as they can help to settle the theoretical controversy by applying data.

Methodology and Data Sets

The methodology for this study is quantitative and correlative. In terms of data collection, an assessment of the research questions required two data sets, one each for corruption and economic growth. The public sector corruption data was taken from the World Bank's (2011) World Governance Indicators (WGI). The WGI data set has several advantages. First, it breaks corruption down into four categories: (a) Government effectiveness, (b) regulatory quality, (c) rule of law, and (d) control of corruption. The commonly-used Corruption Perceptions Index (CPI) from Transparency International (2011) is, by comparison, an incomplete dataset, as it aggregates corruption into a single index, which leads to the inability to analyze the different facts of corruption. Second, the WGI is produced by the World Bank Development Research Group, the World Bank Institute, and the Brookings Institution, three organizations with long experience in studying and quantifying corruption. Third, the WGI data set goes back several years, whereas the CPI data set only goes back five years. Fourth, the WGI has complete data for

200 countries, whereas there are gaps in the CPI data set. For all of these reasons, the WGI is a good choice of dataset through which to examine public sector corruption.

Economic growth was operationalized as gross domestic product (GDP) growth percentage. This data set was taken from the World Bank's (2011) Web site. Once the two data sets—WGI and GDP growth percentage—were collected, they were input into the SPSS ™ 18.0 environment for statistical analysis.

The sampling strategy adopted by the study requires some additional discussion. The WGI is available for 200 countries, as are GDP growth figures. A simple random sampling (SRS) strategy was chosen to draw the sample. The Web site Random.org (2011) was used to generate a list of 10 numbers from 1 to 200. These 10 random numbers were then matched with the countries in the WGI's alphabetized list. The resulting sample consisted of Australia, Azerbaijan, Ethiopia, Israel, Jordan, Morocco, Pakistan, Sierra Leone, Sweden, and Uzbekistan. For each of these ten countries, the WGI values for (a) government effectiveness, (b) regulatory quality, (c) rule of law, and (d) control of corruption were drawn from the years 1999 to 2010, resulting in 480 values. GDP growth per capita was also drawn from 1999 to 2010, resulting in another 120 values. Thus, the final data set had a total of 600 values; the raw data is reproduced in Appendix A.

The simple random sampling (SRS) approach, coupled with the use of a multi-dimensional corruption data set and the use of 10 years in the sample were all means of improving the reliability and generalizability of the study. In particular, testing four separate forms of corruption was a means of being able to determine whether certain forms of corruption (such as the lack of government effectiveness) were more predictive of low economic growth than certain other forms of corruption (such as regulatory quality).

It should also be noted that the WGI scale works as follows. -2.5 is the weakest measurement on each of the four scales—(a) government effectiveness, (b) regulatory quality, (c) rule of law, and (d) control of corruption—and 2.5 is the strongest. Thus, for example, a country that measured 2.5 on the government effectiveness scale would have the most effective possible government. In SPSS ™, the four sub-scales were coded as follows: Government effectiveness: GE; regulatory quality: RQ; rule of law: RL; and control of corruption: CC. GDP growth percentage was rendered as GDP.

Results

The discussion of results will be organized around the individual research questions and hypotheses. After the formal hypotheses are assessed, there is a discussion of the results in terms of ramifications for theory.

Research Question One

The first research question asked: Can corruption be held to be the principal component for the following World Bank (2011) dimensions: Government effectiveness, regulatory quality, control of corruption, and rule of law? The null hypothesis was that there will be more than one component in any factor reduction of the specified dimensions. The alternative hypothesis was that there will be exactly one component in any factor reduction of the specified dimensions. The

purpose of this question was to explore whether it is statistically possible to treat corruption as a single construct. This question is of interest because the World Bank (2011) segments corruption into four separate indicators, namely government effectiveness, regulatory quality, control of corruption, and rule of law. In order to study corruption statistically, it is first necessary to determine the dimensionality of the concept. This analysis was carried out by the use of principal components analysis (PCA). Because of the high inter-correlation between the variables of government effectiveness, regulatory quality, control of corruption, and rule of law, promax rather than varimax rotation was chosen as the extraction method.

Table 1
Principal Components Analysis, Corruption (Promax Rotation)

Correlation Matrix

		Government_Effect	Reg_Quality	Rule_of_Law	Control_Cor
Correlation	Government_Effect	1.000	.964	.980	.969
	Reg_Quality	.964	1.000	.972	.939
	Rule_of_Law	.980	.972	1.000	.981
	Control_Cor	.969	.939	.981	1.000
Sig. (1-tailed)	Government_Effect		.000	.000	.000
	Reg_Quality	.000		.000	.000
	Rule_of_Law	.000	.000		.000
	Control_Cor	.000	.000	.000	

It should be observed that there were high inter-correlations between each of the four measures of corruption used by the World Bank (2011), making promax rotation the appropriate extraction method.

Communalities

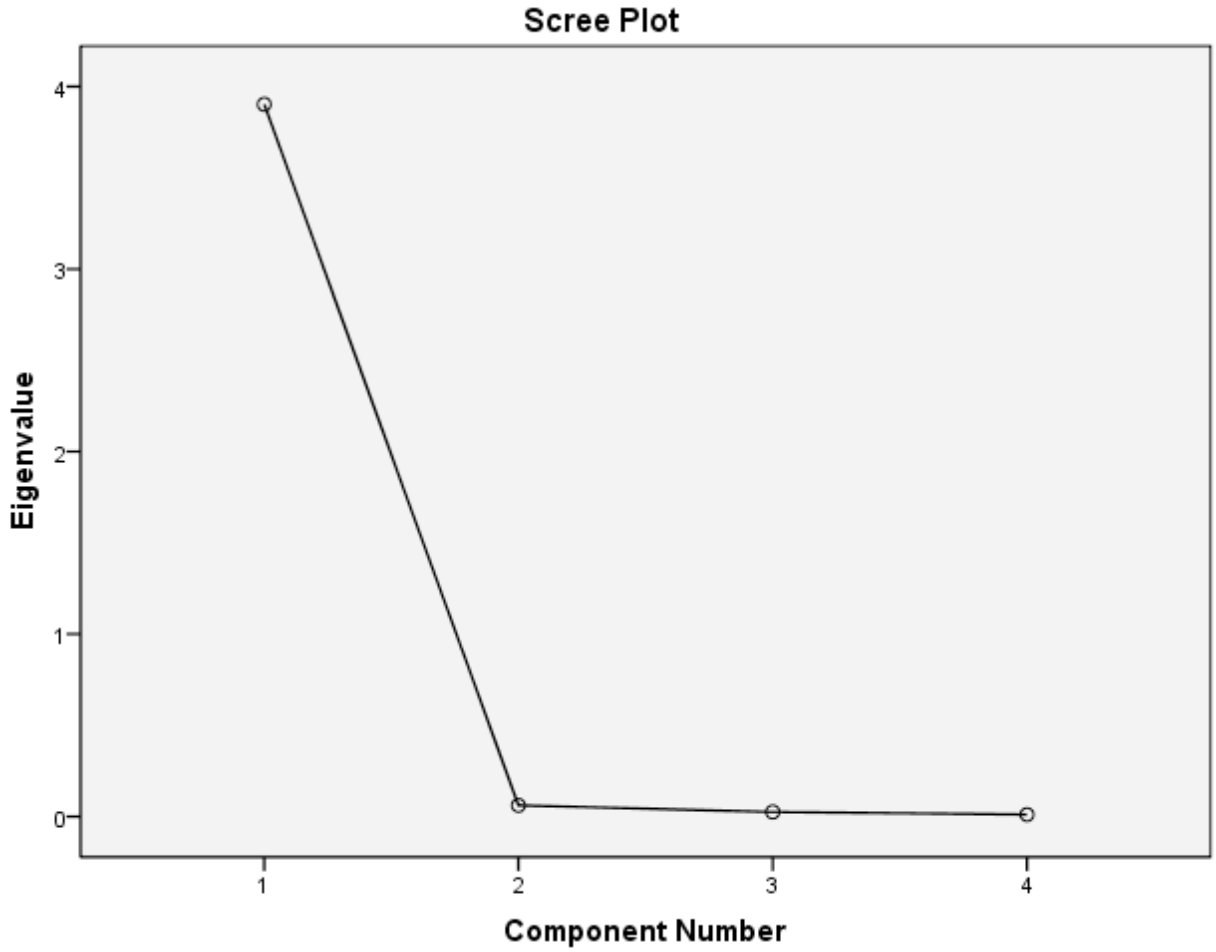
	Initial	Extraction
Government_Effect	1.000	.981
Reg_Quality	1.000	.962
Rule_of_Law	1.000	.991
Control_Cor	1.000	.969

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component		Initial Eigenvalues			Extraction Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
dimension0	1	3.903	97.569	97.569	3.903	97.569	97.569
	2	.061	1.530	99.099			
	3	.025	.626	99.725			
	4	.011	.275	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component
	1
Rule_of_Law	.995
Government_Effect	.991
Control_Cor	.984
Reg_Quality	.981

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

The PCA revealed that only one component could be extracted; this component explained 97.559% of the variance, making for a very steep scree plot. Thus, the null hypothesis for research question 1 cannot be accepted; it does appear that the World Bank (2011) dimensions of corruption are reducible to a single corruption construct.

Another way of getting at essentially the same conclusion is to test the multicollinearity of the four dimensions of corruption offered by the World Bank (2011).

Table 2
Multicollinearity Analysis (IV = Four Corruption Dimensions, DV = Growth)

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Government_Effect	.031	32.493
	Reg_Quality	.045	22.418
	Rule_of_Law	.016	60.734
	Control_Cor	.033	30.698

Multicollinearity Analysis (IV = Four Corruption Dimensions, DV = Growth)
a. Dependent Variable: GDP_Growth

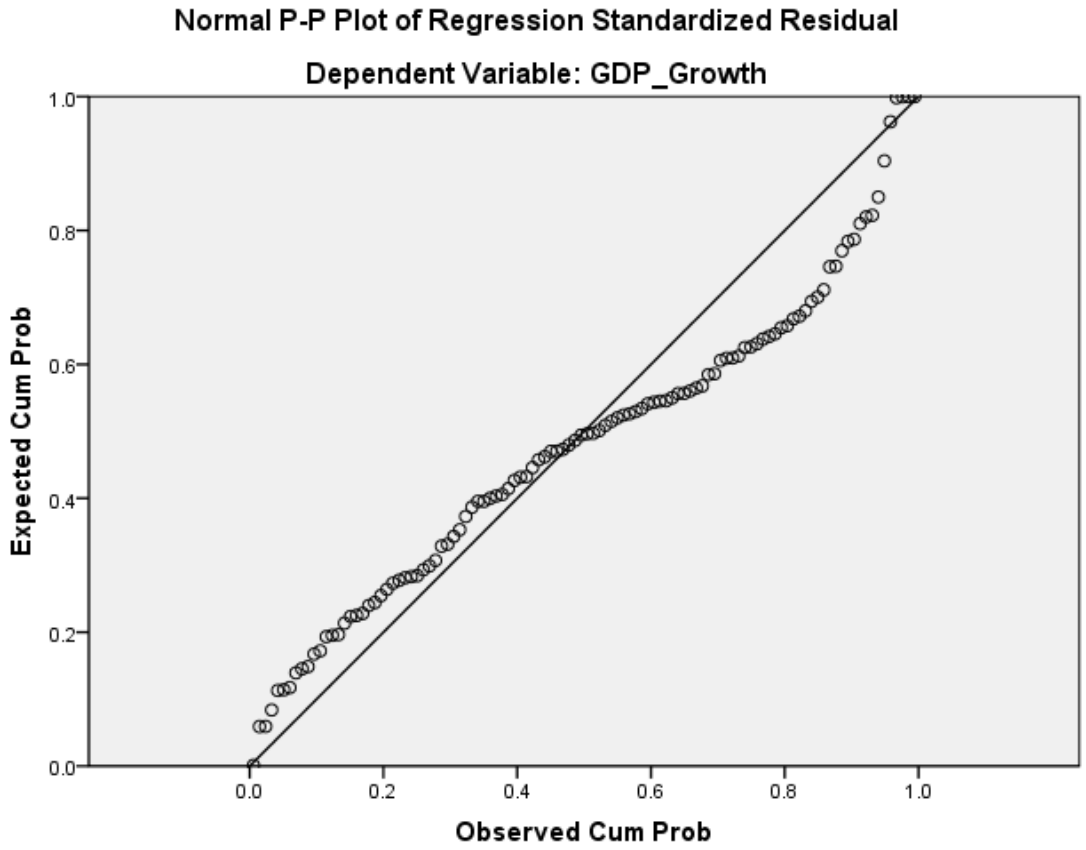
It can be observed that the VIF values are all well over 10, and the tolerance values are all well below 0.01, leaving almost no doubt that the corruption variables are highly multicollinear with each other when GDP growth is treated as the DV. In other words, both PCA

and multicollinearity diagnostics give good reasons to believe that the World Bank's (2010) four measures of corruption actually extract to one construct of corruption.

Research Question 2

The second research question asked: In a time series regression model, how well do the World Bank (2011) dimensions of corruption—government effectiveness, regulatory quality, control of corruption, and rule of law—predict the GDP growth of 10 randomly-selected countries treated as a single sample? The null hypothesis was that the regression will not be significant. The alternative hypothesis was that the regression will be significant. To explore this research question, the 1999-2009 regression between GDP and corruption—in each of the dimensions of government effectiveness, regulatory quality, control of corruption, and rule of law—was fit to the observed 2010 values.

Figure 1: *P-Plot of Regression Model*



The p-plot demonstrates that the linear model is a fairly good fit with the data. This impression is confirmed in the actual regression analysis. Because of the multicollinearity of the IVs, there was no need to conduct the regression in such a way as to identify the R value added by each of the four variables. The purpose of the regression analysis was ultimately to derive the equation that would predict the 2010 values for each of the four dimensions of corruption, and to

test this prediction against the actual figure from 2010. With that explanation in mind, the linear regression analysis follows below:

Table 3: *Regression Analysis (IV =Four Dimensions of Corruption, DV = GDP Growth)*

Model Summary[b]

Model					Change Statistics		
	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1
1	.446[a]	.199	.169	5.211826294	.199	6.531	4

a. Predictors: (Constant), Control_Cor, Reg_Quality, Government_Effect, Rule_of_Law
b. Dependent Variable: GDP_Growth

Model Summary[b]

Model	Change Statistics	
	df2	Sig. F Change
1	105	.000

b. Dependent Variable: GDP_Growth

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	709.567	4	177.392	6.531	.000[a]
	Residual	2852.129	105	27.163		
	Total	3561.696	109			

a. Predictors: (Constant), Control_Cor, Reg_Quality, Government_Effect, Rule_of_Law
b. Dependent Variable: GDP_Growth

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	6.750	.559		12.079	.000
	Government_Effect	-1.523	2.491	-.304	-.611	.542
	Reg_Quality	4.910	2.112	.961	2.325	.022
	Rule_of_Law	-4.250	3.439	-.841	-1.236	.219
	Control_Cor	-.847	2.281	-.180	-.371	.711

a. Dependent Variable: GDP_Growth

The linear regression analysis was highly significant (because $p < .001$) and predicted 19.9% of the variation in the DV. The linear regression equation was as follows:

GDP Growth = 6.750 + (Government Effectiveness)(-1.523) + (Regulatory Quality)(4.910) + (Rule of Law)(-4.250) + (Control of Corruption)(-0.847).

With this formula in hand, it is possible to use the 2010 observations for government effectiveness, regulatory quality, rule of law, and control of corruption, and to see how well (in terms of standard deviations) they predict the actual 2010 figure for GDP growth of the sample. Here are the actual 2010 figures for GDP growth for each country in the sample, the predicted figures, and the distance (in SDs) between the actual and predicted figures:

Table 4
2010 GDP Growth Figures for All Countries in Sample

Country	**Actual 2010 GDP Growth**	**Predicted GDP Growth**	**SD Difference**
Australia	1.290121	.32	Less than 1
Azerbaijan	5.000451	3.45	Less than 1
Ethiopia	10.136945	6.79	More than 1
Israel	4.656566	4.01	Less than 1
Jordan	3.106954	6.99	More than 1
Morocco	3.299156	2.34	Less than 1
Pakistan	4.357649	3.21	Less than 1
Sierra Leone	4.948500	.54	More than 1
Sweden	5.536081	4.34	Less than 1
Uzbekistan	8.500000	5.43	More than 1
SAMPLE	6.99	3.742	More than 1

The linear regression was a good fit with the data in the case of Australia, Azerbaijan, Israel, Morocco, Pakistan, and Sweden. Also, when the sample was considered as a whole, the linear regression was not a good fit. This analysis leads to two conclusions: (a) Different countries display different dynamics when it comes to the fit between corruption and GDP growth and (b) the overall goodness of fit is volatile.

Hypothesis Testing Table

Research Question	Hypotheses	Results
Research Question 1: Can corruption be held to be the principal component for the following World Bank (2011) dimensions: Government effectiveness, regulatory quality, control of corruption, and rule of law?	H_{01}: No, there will be more than one component in any factor reduction of the specified dimensions. H_{1A}: Yes, there will be exactly one component in any factor reduction of the specified dimensions.	Null hypothesis was rejected.
Research Question 2: In a time series regression model, how well do the World Bank (2011) dimensions of corruption—government effectiveness, regulatory quality, control of corruption, and rule of law—predict the GDP growth of 10 randomly-selected countries treated as a single sample?	H_{02}: The regression will not be significant. H_{2A}: The regression will be significant.	Null hypothesis could not be rejected.

Conclusion and Discussion of Results

Economic growth is a complex phenomenon. Historically, economies have grown in the absence of market efficiency. It may be the case that what neoclassical theory suggests about the corruption-growth relation is true for mature economies but not for immature ones, which can continue to post robust growth even in the absence of efficiency and information. A future study would do well to test the connection for more mature economies; it may be that there is a threshold of development beyond which the impact of corruption on growth is much more pronounced than it was in this sample.

The results of the study were as follows: (a) Corruption is a single construct that exerts significant influence on the dimensions of government effectiveness, rule of law, control of corruption, and regulatory quality when these variables are treated as IVs for the DV of GDP growth; thus, on a conceptual level, there is a close link between corruption and GDP growth; and (b) in time series, the four variables of government effectiveness, rule of law, control of corruption, and regulatory quality did not serve as close (less than 1 SD) of GDP growth when 1999-2009 was treated as the observation period, and 2010 was the case; thus, there is some volatility in the GDP growth-corruption link that needs to be explored further.

Appendix A: Raw Data

Table 5 contains all the raw data used in the study as it was entered into SPSS. All of the data were obtained from the World Bank (2011). It should be noted that Case 1: Australia, Case 2: Azerbaijan, Case 3: Ethiopia, Case 4: Israel, Case 5: Jordan, Case 6: Morocco, Case 7: Pakistan, Case 8: Sierra Leone, Case 9: Sweden, and Case 10: Uzbekistan.

Table 5: *Raw Data for the Study*

Case	Government_Effect	Reg_Quality	Rule_of_Law	Control_Cor	GDP_Growth
1	1.659664	1.290418	1.708992	1.884342	5.160042
1	1.602496	1.468103	1.769038	1.765288	3.950023
1	1.744479	1.655114	1.725923	1.960539	1.979972
1	1.706604	1.456512	1.762698	1.734808	3.829966
1	1.840580	1.590999	1.825701	1.924659	3.160016
1	2.030122	1.743432	1.823453	2.097819	4.139959
1	1.772699	1.606607	1.713069	1.934268	2.840068
1	1.742145	1.625979	1.757039	1.960590	3.069944
1	1.847083	1.681155	1.747598	2.047173	3.770041
1	1.802697	1.769631	1.766647	2.120563	3.729978
1	1.750688	1.780546	1.737847	2.056221	1.290121
1	1.816225	1.656553	1.770200	2.061007	2.455885
2	-.940232	-1.109611	-1.056318	-1.257760	7.400000
2	-.973489	-.956735	-1.067130	-1.128473	11.100000
2	-.984711	-.921543	-1.093343	-1.098676	9.900000
2	-.947459	-.723752	-.862705	-1.057677	10.600000
2	-.795085	-.595555	-.829408	-.943471	11.200000
2	-.769487	-.593428	-.807660	-1.076350	10.200000
2	-.647141	-.549935	-.748930	-.991265	26.400000
2	-.617721	-.499194	-.840134	-.982672	34.500000
2	-.768178	-.444459	-.790404	-1.021013	25.049000
2	-.759593	-.343754	-.770317	-1.018693	10.800000
2	-.683165	-.367201	-.860067	-1.098975	9.300000
2	-.839290	-.444504	-.882899	-1.172476	5.000451
3	-1.282354	-1.337455	-.835047	-1.156064	5.162406
3	-.937772	-1.176876	-.736867	-.694222	6.072859
3	-.913406	-1.159953	-.834544	-.493322	8.301432
3	-.929978	-1.232561	-.873446	-.732055	1.514717
3	-.895871	-1.174734	-.714305	-.697760	-2.161082
3	-.705378	-.962908	-.725596	-.700956	13.572361
3	-.894767	-1.109605	-.864727	-.775617	11.818844

3	-.591183	-.945077	-.592690	-.625641	10.834629
3	-.422893	-.890041	-.591736	-.612516	11.456015
3	-.411041	-.827518	-.654078	-.653383	10.788554
3	-.418031	-.947195	-.780866	-.733391	8.791996
3	-.349221	-.884247	-.755556	-.704570	10.136945
4	.991541	1.092473	1.258530	1.471174	3.300639
4	1.120938	1.064131	1.072206	1.291518	9.196468
4	1.183603	1.186582	1.055026	1.060521	-.042460
4	1.077059	.964155	1.033463	1.284244	-.664881
4	1.214810	.942278	.824221	1.064576	1.511574
4	1.258483	.853964	.826532	.920623	4.998352
4	1.055816	.884121	.805676	.818700	5.098819
4	1.324314	1.011001	.894705	1.003169	5.698423
4	1.266122	1.095820	.872173	.806560	5.314894
4	1.345444	1.167046	.886149	.842456	4.261645
4	1.137558	1.109720	.809369	.723207	.765950
4	1.243075	1.215053	.876554	.635113	4.656566
5	.050700	.028946	.295918	-.127159	3.391002
5	.087430	.400805	.377244	-.012571	4.244563
5	-.037881	.246179	.375207	.028388	5.269296
5	.093582	.029778	.165710	-.104231	5.785796
5	.237250	.221963	.391021	.304168	4.178075
5	.152728	.325558	.394881	.370979	8.558951
5	.029136	.162978	.412803	.325915	8.121308
5	.136366	.353991	.428311	.304255	7.943712
5	.193374	.321867	.478899	.297889	8.486978
5	.212557	.340466	.488858	.425421	7.608863
5	.223290	.300326	.295002	.192704	2.325338
5	.078913	.243971	.219381	.040348	3.106954
6	-.033482	-.166049	.305092	.325025	.529417
6	.027467	-.057108	.282571	.406404	1.592568
6	-.030984	-.051417	.163697	-.031391	7.551952
6	-.135538	-.156851	.005331	-.171820	3.316036
6	-.115209	-.270401	.011570	-.211233	6.316967
6	-.000945	-.263513	.080451	-.088444	4.801866
6	-.259468	-.405823	-.127373	-.301038	2.978512
6	-.122879	-.169361	-.218345	-.401103	7.759852
6	-.167824	-.191485	-.191711	-.329853	2.705774
6	-.172265	-.179445	-.260801	-.369571	5.587056
6	-.204823	-.056922	-.216827	-.311046	4.948633

6	-.169997	-.113998	-.185240	-.158336	3.299156
7	-.587722	-.455160	-.653582	-1.156064	3.660133
7	-.448940	-.494710	-.694577	-.963969	4.260088
7	-.577282	-.749842	-.858550	-.824593	1.982484
7	-.393598	-.798149	-.692633	-.928953	3.224430
7	-.416672	-.726962	-.766449	-.720799	4.846321
7	-.442181	-.893113	-.811158	-1.089137	7.368571
7	-.426255	-.613402	-.873671	-1.048273	7.667304
7	-.404329	-.463446	-.826399	-.769768	6.177542
7	-.453421	-.515795	-.900537	-.748676	5.683116
7	-.683806	-.582686	-.971667	-.805081	1.595981
7	-.779226	-.548306	-.883006	-1.084259	3.632478
7	-.767301	-.596679	-.785571	-1.103601	4.357649
8	-1.465737	-1.614127	-1.488120	-.776769	-8.121774
8	-1.456773	-1.325973	-1.195675	-.874309	3.807283
8	-1.459702	-1.387627	-1.402734	-.916408	18.169937
8	-1.513765	-1.267620	-1.328197	-.751094	27.461715
8	-1.234312	-1.145831	-1.223377	-.908741	9.288053
8	-1.115024	-1.003607	-1.090035	-.875857	7.513944
8	-1.351272	-1.082929	-1.193759	-1.095469	7.178284
8	-1.177747	-1.168498	-1.056724	-1.042335	7.280906
8	-1.194187	-1.062526	-1.045072	-.891336	6.442019
8	-1.169941	-.969280	-.967970	-.930563	5.534067
8	-1.195736	-.783053	-.914145	-.927958	3.200000
8	-1.190553	-.722749	-.940364	-.757087	4.948500
9	1.987468	1.363200	1.799890	2.304953	4.659838
9	1.994642	1.259979	1.778988	2.331185	4.452193
9	2.001230	1.476247	1.801172	2.417421	1.262310
9	2.012313	1.651065	1.856106	2.312793	2.483417
9	2.076163	1.649411	1.888332	2.233149	2.335702
9	2.101886	1.688025	1.901101	2.173478	4.234862
9	1.897808	1.517435	1.778742	2.011842	3.160785
9	1.869500	1.469833	1.847456	2.211880	4.297179
9	1.986614	1.605360	1.894216	2.249531	3.314245
9	1.906469	1.680807	1.923738	2.255100	-.613416
9	2.039314	1.716703	1.950401	2.275511	-5.333024
9	2.016361	1.719856	1.947921	2.250953	5.536081
10	-1.147974	-1.866500	-1.085783	-1.073197	4.300000
10	-1.251375	-2.146652	-1.146304	-1.046174	3.800000
10	-.949327	-2.098461	-1.128239	-.908705	4.200000

10	-1.185245	-1.560797	-1.466131	-.992828	4.000000
10	-1.113833	-1.527170	-1.374255	-1.006303	4.200000
10	-.992262	-1.644441	-1.347473	-1.056435	7.700000
10	-1.202841	-1.580688	-1.444766	-1.183383	7.000000
10	-1.059061	-1.639265	-1.418052	-.902223	7.300000
10	-.781090	-1.429638	-1.045599	-.814400	9.500000
10	-.764474	-1.389499	-1.123595	-1.026396	9.000000
10	-.707807	-1.495266	-1.273099	-1.264270	8.100000
10	-.796789	-1.589353	-1.372552	-1.316347	8.500000

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