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Chapter

The Impact of Corruption on Economic Growth: A Nonlinear Evidence

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Abstract

On basis of the lubricating effect hypothesis of corruption (grease-the-wheels hypothesis), the impact of corruption on growth seems ambiguous. Therefore, the question that arises is to what extent corruption can be tolerated and at what threshold it has detrimental effect on an economy. This chapter investigates the impact of corruption on economic growth by testing the hypothesis that the relationship between these two variables is nonlinear, and we assess whether the belief that corruption has detrimental effects on the economy is always true. In this chapter, a panel data analysis has been used to examine 65 countries over the 1987–2021 period. Our findings are that corruption can have a positive effect on growth. The results indicate that beyond an optimal threshold, both high and low corruption levels can decrease economic growth. Under this optimal threshold, a moderate level of corruption, defined by the point of reversal of the curve of the marginal corruption effect on growth, could have advantages for economic growth.

Keywords: corruption, economic growth, panel data: PCSE estimator

1. Introduction

Empirical literature in the field has consistently reported a negative correlation between economic growth and corruption. These studies have shown that developed countries are known by low corruption levels and a relatively high growth rate [1], and by contrast, most developing countries are known by high poverty and corruption levels [2, 3].

The novelty of the empirical contribution is that we estimate a nonlinear growth model that allows for threshold effects. To this end, we will use the method proposed by Beck and Katz [4], who suggested estimating linear models of time-series cross-section (TSCS) data by ordinary least squares (OLS). For this, they proposed the panel-corrected standard errors model (PCSE).

The chapter is structured as follows: Section 1 presents a review of both the theoretical and empirical literature; Section 2 presents the research methodology and the main results followed by a discussion of the findings in the final section.
2. Literature review

The theoretical and empirical literature on corruption has generated a rich debate over the last 40 years. This literature can be summarized in two opposing theories. The first assumes that corruption “lubricates the economic cycle” or “greases the economic wheel” and produces the most efficient economies [5–10]. In contrast, the second theory blames corruption and sees it as a factor that slows down economic activity [11–14].

Mauro [15] detects a weak statistical significance between corruption and economic growth. However, this significance disappears once investment rate is introduced in the model. Mo [13] finds that corruption negatively affects economic growth. However, the additional introduction of variables such as investment to GDP ratio, political stability, and human capital weakens or eliminates the significance of this negative impact.

Aidt et al. [16] show that the impact of corruption on economic growth depends on institutional quality. Moreover, they show that when political institutions are of low quality, corruption has little impact on growth. On the other hand, Méndez and Sepúlveda [17] find that high-quality political institutions result in corruption being harmful to growth. In accord with Méndez and Sepúlveda [17], Heckelman and Powell [8] find that at the lowest levels of democracy, corruption is harmful to growth but becomes less harmful and eventually beneficial as the level of democracy increases.

Méon and Weill [10] emphasize the hypothesis of the lubricating effect of corruption by studying the interaction between institutional quality, corruption, and production efficiency, thereby validating the hypothesis that corruption may have a positive effect on economic activities. In the same context, Kato and Sato [18] provide evidence supporting the “greasing the wheels” hypothesis and argue that corruption enhances economic growth.

Mushfiq [14] tests corruption-growth relationship in a nonlinear framework. He shows that corruption increases growth even at a higher level of corruption. In the same context, Allan and Roland [19] use linear and nonlinear panel methods over the period 1998–2009 for determining the causal relationship between economic growth and corruption in 42 developing countries. Moreover, Aghion et al. [20] show that corruption affects the marginal effect of taxation on growth.

Huang [21] examines the causal relationship between corruption and economic development in 13 Asia-Pacific countries and finds that South Korea and China are experiencing economic advancement despite high-corruption levels.

Trabelsi and Trabelsi [22] show that beyond an optimal threshold, both high and low corruption levels can decrease economic growth. Under this optimal threshold, a moderate level of corruption, defined by the point of reversal of the curve of the marginal corruption effect on growth, could have advantages for economic growth.

All these studies indicate that corruption may have either positive or negative effects on economic growth, making the issue ambiguous and confirming the non-linearity of the relationship between corruption and growth. However, one must ask to what extent can corruption be tolerated and from what threshold would it become destructive to the economy. The questioning is motivated by the fact that studies do not test whether there is a growth-enhancing or growth-reducing level of corruption, and not one study thoroughly identified the corruption level that will allow an optimal growth.
3. Research methodology

3.1 Description of data

Corruption is not the only factor that affects economic growth [23–25]. Other control variables are also relevant [26]. According to theory and on the basis of arguments cited in the literature, we propose economic growth depends mainly on investment, inflation, and trade openness.

The study is based on a panel data set over the period 1987–2021 for 65 countries taken from the World Development Indicators (Growth rate, Foreign direct investment, Inflation & Trade). The ICRG index has been obtained from the Quality of Government Institute, the Transparency International and International Country Risk Guide published by Political Risk Services group. It measures the risk involved in corruption rather than the perceived level of corruption.

The descriptive analysis for the full set of 65 countries appears in Table 1. It shows that average economic growth is 3.63% with an average corruption index of 3.35.

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|----------|-----|------|-----------|-----|-----|
| growth   | 2275 | 3.631514 | 3.694122 | -17.14604 | 21.82889 |
| Fdi      | 2275 | 2.792351 | 4.098536 | -12.20843 | 33.56602 |
| Inf      | 2275 | 5.787994 | 7.268143 | -11.68611 | 59.46156 |
| Trade    | 2275 | 81.67821 | 51.23418 | 10.74832 | 439.6567 |
| Icrg     | 2275 | 3.351098 | 1.462316 | 0 | 6 |

Table 1. Descriptive statistics.

3.2 Empirical model

Empirical studies generally opt for the nonlinear approach to study the impact of corruption on economic growth (Méon and Sekkat [11]; [14, 16, 17]; Allan and Roland [19]; [27–29]). This is a quadratic function based on the hypothesis that the impact of corruption on growth is not always negative and that a moderate corruption level could have advantages for economic growth.

In order to verify this, a cross-sectional framework is used in which growth rate and the ICRG index are observed only once for each country. The scatter plot (Figure 1), using the fitted Kernel curve, illustrates and confirms the hypothesis that the relationship between corruption and economic growth (fitted values) is nonlinear.
The curve is clearly increasing in the middle range of corruption and decreasing where corruption is least and most.

Therefore, we propose the following quadratic model. Subscripts i (i = 1,...,65) and t (t = 1987,...,2021) denote index country and time, respectively.

\[ \text{Growth}_{it} = \alpha + \beta \text{Inf}_{it} + \gamma \text{Trad}_{it} + \mu \text{Fdi}_{it} + \delta \text{Icrg}_{it} + \lambda \text{Icrg}^2_{it} + \varepsilon_{it} \]  

Past studies have used a panel of 5-year averages and the system GMM estimator because this choice reduces, in general, short run fluctuations and resolves the endogeneity due to time invariant effects; but this method will not address endogeneity due to the possible interactions between higher growth rates and greater resources to combat corruption or other time-varying effects. Levin and Satarov [30] and Paldam [31] have presented evidence for the existence of both types of endogeneities.

Recently, the empirical studies characterized by having repeated observations over time on some countries are resolved by others’ models. In this study, we will follow the Beck and Katz [4] methodology, who suggested estimating linear models of time-series cross-section (TSCS) data by ordinary least squares (OLS), and they proposed the panel-corrected standard errors (PCSE) estimator.

The results for GDP growth using the PCSE estimator are reported in Table 2.

It can be seen that corruption negatively affects (−1.0853466) economic growth unlike the square coefficient of corruption, which positively affects (0.1982614) economic growth. The significance of \( \text{Icrg}^2 \) coefficient confirms the nonlinearity of this model and shows the presence of a threshold above which there will be a change of sign.

Figure 1. Growth and corruption: countries distribution.
3.3 Determining the threshold

We will determine the governance level that allows for achieving maximum growth. The resulting model is:

\[
\text{Growth} = 2.153 - 0.0392\text{Inf} + 0.0112\text{Trad} - 1.08\text{Icrg} + 0.198\text{Icrg}^2 + 0.062\text{Fdi}
\]  

(2)

In deriving growth through governance, we get:

\[
\frac{\partial \text{Grow}}{\partial \text{Icrg}} = -1.08 + 0.396\text{Icrg} = 0
\]

(3)

Relationship (3) shows that an optimum is achieved by \(\text{Icrg} = 1.08/0.396 = 2.73\). This indicates that up to a corruption index of 2.73, the trend of the bell-shaped curve (Figure 2) increases showing that there is a positive relationship between corruption and economic growth.

This bell-shaped curve (Figure 2) is interpreted by the fact that corruption, through tax evasion, has two types of effects in economics.

First, it offers households a tax that can be consumed or invested, and therefore, it could improve growth up to a certain threshold. This optimal threshold represents the reversal point of the curve otherwise the country can be found in an underdevelopment trap like several countries that are immersed in corruption. This corruption, if significant, will reduce state resources because of productive public spending, which will lead to a loss in economic growth that sooner or later will lead to an uprising calling for establishing democratic principles and good governance.

These results indicate that low of corruption (Icrg < 2) negatively affects economic growth. This result disappears in the presence of corruption (Icrg > 3). However, for an average corruption of (2 ≤ Icrg ≤ 3), we will be at an optimum level of growth (Figure 2).

This result may surprise those who advocate lack corruption, but it can be explained by the fact that administrative delays resulting from absence of “bribes” paid in a corrupt economy may dampen economic growth and reduce economic development.
The results obtained are derived from static panel model, which has some shortcomings. One of the reasons is not to take into account growth's lag operator. Indeed, economic growth is attributed to the results obtained a year earlier, and therefore, it is desirable to include this variable in the model. Therefore, a dynamic panel is needed.

### 3.4 The dynamic model

The dynamic panel model we propose is defined as follows:

\[
\text{Growth}_t = \alpha + \rho \text{Growth}_{t-1} + \beta \text{Inf}_t + \gamma \text{Trad}_t + \mu \text{Fdi}_t + \delta \text{Icrg}_t + \lambda \text{Icrg}_t^2 + \varepsilon_t \tag{4}
\]

Where \( \text{Growth}_{t-1} \) represents per capita lagged GDP growth rate. The results of the estimation are reported in Table 3, which shows that \( H_0 \) hypothesis of the validity of the instruments is not rejected (the probability of Sargan statistics exceeds 5%, which means that instruments are in all exogenous). Similarly, there is no order 2 serial autocorrelation (probability of Arellano & Bond AR test (2) is greater than 5%). This allows us to assert that the GMM system model is appropriate and specifies well the instruments, with no heteroscedasticity or autocorrelation problems.

This method is more robust than the previous one. Table 3 confirms our hypothesis that corruption negatively affects growth (−1.86). However, square corruption positively affects growth (0.33). The results obtained by the two methods (static and dynamic) confirm the positive impact of investment on growth.

The estimated model is written as follows:

\[
\text{Growth} = 2.885 + 0.0505 \text{Inf} + 0.0419 \text{Trad} - 1.865 \text{Icrg} + 0.332 \text{Icrg}^2 + 0.0213 \text{Fdi} + 0.098 \text{Growth}_{t-1} \tag{5}
\]

![Corruption-Growth](image)

**Figure 2.** Bell-shaped curve of growth through governance.
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By analogy to Section 2.3, determining the threshold effect shows that an optimum is achieved by $I_{crg} = 1.865/0.664 = 2.81$. This value confirms our hypothesis on the relevance of moderate corruption to achieve an optimal growth value.

4. Results and discussion

The concave function (Figures 1 and 2) may be interpreted in the following way. Corruption, which facilitates tax evasion, has two types of effects in economics. It offers households an opportunity of tax savings that can be consumed or invested, as tax evasion leads to a transfer of public resources to private agents [32, 33]. This could improve growth up to a certain threshold. The optimal threshold represents the reversal point of the curve; otherwise, the country may suffer underdevelopment like several countries immersed in corruption.

This corruption, if significant, will reduce state resources because of productive public spending, which will lead to a loss in economic growth, which sooner or later will lead to an uprising calling for establishing democratic principles and good governance.

This result may surprise those who advocate the negative effects of corruption, but it can be explained by the fact that administrative delays resulting from absence of “bribes” paid in a corrupt economy may dampen economic growth and reduce economic development.

5. Conclusion

The aim of this paper is to examine the impact of corruption on economic growth. The empirical literature that reported a linear relationship between corruption

| Coef.     | Std. Error | z     | P > z | [95% Conf. Interval] |
|-----------|------------|-------|-------|----------------------|
| Growth L1 | 0.0987477  | 0.0229037 | 4.31* | 0.000 | 0.0538573 to 0.143638 |
| Inf       | 0.0505543  | 0.0260105 | 1.94** | 0.052 | -0.0004253 to 0.1015339 |
| Fdi       | 0.0212885  | 0.0311189 | 0.68** | 0.049 | -0.0397035 to 0.0822805 |
| Trade     | 0.041935   | 0.0092438 | 4.54* | 0.000 | 0.0238175 to 0.0600525 |
| Icrg      | -1.864927  | 0.5426194 | -3.44* | 0.001 | -2.928442 to -0.8014126 |
| Icrg2     | 0.331679   | 0.0813414 | 3.30* | 0.001 | 0.1011917 to 0.4200442 |
| _Cons     | 2.885563   | 1.041519 | 2.77* | 0.006 | 0.844223 to 4.926903 |

AR (2): Arellano and Bond test of null of zero second-order serial correlation, distributed N(0, 1) under null. Sargan test: is a statistical test used to check for over-identifying restrictions in a statistical model. t-statistics are displayed in parentheses under the coefficient estimates.* test statistic is significant at the 1% level. ** test statistic is significant at the 5% level and. *** the numbers in parentheses are p-values.

Table 3.
Estimation of the model by GMM.

By analogy to Section 2.3, determining the threshold effect shows that an optimum is achieved by $I_{crg} = 1.865/0.664 = 2.81$. This value confirms our hypothesis on the relevance of moderate corruption to achieve an optimal growth value.
and economic development failed to differentiate between growth-enhancing and growth-reducing levels of corruption.

In our study, we have presented evidence that suggests the existence of hump-shaped relationship between corruption and growth, which shows the existence of a nonlinear relationship between these two variables. This nonlinear result shows that growth increases at middle-corruption and decreases as nations achieve higher level of governance (low corruption). In other words, the results indicate that higher or lower levels of corruption negatively affect growth. Minimum corruption can be beneficial to economic growth. This confirms some theories that assume that corruption “lubricates the economic cycle” and produces the most efficient economies. However, this lubricating effect has a threshold beyond which it becomes a threat to economic growth. Conversely, lack of corruption may be a mechanism that slows down growth.

**Statements and declarations**

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**Additional information**

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References

[1] Cooper DA, Kriekhaus J, Lusztig M. Corruption, democracy and economic growth. International Political Science Review. 2006;27(2):121-136

[2] Chetwynd E, Chetwynd F, Spector B. Corruption and poverty: A review of recent literature, management systems international, Final Report, Washington. 2003

[3] Umbreen J, Saadat F. Corruption pervades poverty: In perspective of developing countries. Research Journal of South Asian Studies. 2015;30(1):175-187

[4] Beck N, Katz J. What to do (and not to do) with time-serie cross-section data. American Political Science Review. 1995;89(3):634-647

[5] Acemoglu D, Verdier T. The choice between market failures and corruption. The American Economic Review. 2000;90(1):194-211

[6] Barreto RA. Endogenous corruption in a neoclassical growth model. European Economic Review. 2000;44(1):35-60

[7] Egger P, Winner H. Evidence on corruption as an incentive for foreign direct investment. European Journal of Political Economy. 2005;21(4):932-952

[8] Heckelman JC, Powell B. Corruption and the institutional environment for growth. Comparative Economic Studies. 2010;52:351-378

[9] Johnson ND, Ruger W, Sorens J, Yamarik S. Corruption, regulation and growth: An empirical study of the United States. Economics of Governance. 2014;15(1):51-69

[10] Méon PG, Weill L. Is corruption an efficient grease? World Development. 2010;36(3):244-259

[11] Méon PG, Sekkat K. Does corruption grease or sand the wheels of growth? Public Choice. 2005;122(1):69-97

[12] Mironov M. Bad Corruption, Good Corruption and Growth. Chicago: University of Chicago; 2005

[13] Mo PH. Corruption and economic growth. Journal of Comparative Economics. 2001;29:66-79

[14] Mushfiz S. Economic growth with endogenous corruption: An empirical study. Public Choice. 2011;146:23-41

[15] Mauro P. Corruption and growth. Quarterly Journal of Economics. 1995;60(3):681-712

[16] Aidt T, Dutta J, Sena V. Governance regimes, corruption and growth: Theory and evidence. Journal of Comparative Economics. 2008;36:195-220

[17] Méndez F, Sepúlveda F. Corruption, growth and political regimes: Cross country evidence. European Journal of Political Economy. 2006;22:82-98

[18] Kato A, Sato T. Greasing the wheels? The effect of corruption in regulated manufacturing sectors of India. Canadian Journal of Development Studies. 2015;36:459-483

[19] Allan SW, Roland C. Economic growth and corruption in developing economies: Evidence from linear and non-linear panel causality tests. Business, Finance and Economics in Emerging Economies. 2013;8(2):21-43

[20] Aghion P, Akcigit J, Kerr WR. Taxation, corruption, and growth, National Bureau of Economic Research, NBER Working Papers: 21928. 2016
[21] Huang CJ. Is corruption bad for economic growth? Evidence from Asia-Pacific countries. The North American Journal of Economics and Finance. 2016;35:247-256

[22] Trabelsi MA, Trabelsi H. At what level of corruption does economic growth decrease? Journal of Financial Crime. 2021;28(4):1317-1324

[23] Barro RJ. Economic growth in a cross section of countries. Quarterly Journal of Economics. 1991;106:407-443

[24] Brunetti A. Political variables in cross-country growth analysis. Journal of Economic Survey. 1997;11:163-190

[25] Lambsdorff JG. Corruption in empirical research - A review. Transparency International Working Paper, Berlin. 1999

[26] Fernando D, Carlos D, MarÃ­a Angeles CP. Growth, inequality and corruption: Evidence from developing countries. Economics Bulletin. 2016;36(3):1811-1820

[27] Eatzaz A, Muhammad AU, Muhammad IA. Does corruption affect economic growth? Latin American Journal of Economics. 2012;49(2):277-305

[28] Kolstad I, Wiig A. Digging in the dirt? Extractive industry FDI and corruption. Economics of Governance. 2013;14(4):369-383

[29] Saha S, Gounder R. Corruption and economic development nexus: Variations across income levels in a non-linear framework. Economic Modelling. 2013;31:70-79

[30] Levin M, Satarov GA. Corruption and institutions in Russia. European Journal of Political Economy. 2000;16:113-132

[31] Paldam M. The cross-country pattern of corruption: economics, culture and the seesaw dynamics. European Journal of Political Economy. 2002;18:215-240

[32] Cerqueti R, Coppier R. Economic growth, corruption, tax evasion. Economic Modelling. 2011;28:489-500

[33] Tanzi V, Davoodi HR. Corruption, growth and public finances. International Monetary Fund Working Paper. 2000