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Growth, Inequality and Corruption: Evidence from Developing Countries

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Abstract

This paper presents eclectic evidence on the corruption-growth relationship in a wide sample of developing countries. Direct effects of corruption on growth are positive, while the indirect effects, through investment and human capital channels, are negative. Finally, inequality is not significant.

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1. INTRODUCTION

The goal of this paper is to analyze the channels by which corruption affects economic growth. This could help us to understand the relevance of corruption in order to explain differences across countries with respect to growth. There is not a clear consensus on the role of corruption in explaining economic performance. Some authors argue that corruption acts as “greasing the wheels” of the economy, because it allows economic agents to overcome bad policy, complicated regulations, or inefficient bureaucracy (Leff, 1964; Leys, 1965; Lui, 1985; Beck and Maher, 1986; Acemoglu and Verdier, 2000; Aidt, 2003; Egger and Winner, 2005; and Huang 2016). In addition, Dreher and Gassebner (2013) using data for 43 countries and Mendoza et al. (2015) for the Philippines point out that corruption helps entrepreneurship and then economic growth when the country has a preexisting bad business climate.[1]

On the contrary, there is a vast literature showing that corruption acts as “sand-in-the-wheel” of economic development. It is detrimental to growth through a direct effect: corruption decreases productivity because it leads to a lower productive effort, degradation of the quality of resources and a general misallocation of existing resources (see Ugur, 2014 for a review of the literature). Furthermore, there is also an indirect effect working through different channels. Corruption reduces private and foreign direct investment and the level of human capital, and encourages higher public investment in less productive areas, creating restrictions to economic development (Mauro 1995, 1998; Tanzi and Davoodi 1997; Kurer, 1993; Bardhan, 1997; Wei, 2000; Javorcik and Wei, 2009). Moreover, Aghion et al. (2016) show that corruption affects the marginal effect of taxation on growth and d´Agostino et al. (2016) conclude that the interactions of corruption with military spending and investment affect negatively economic growth**.**

Alternatively, a possible channel by which corruption can affect economic growth is through inequality. In first place, with respect to the relationship between corruption and inequality Gupta et al (2002), Gyimah-Brempong and Gyimah-Brempong (2006), and Transparency International (2012) assert that corruption increases income inequality through biased tax systems favoring the wealthy and well-connected lower levels and effectiveness of social spending and unequal access to education and public services. In turn, Li et al. (2000) find for Asian, OECD, and Latin American countries that corruption increases the Gini coefficient in a quadratic way: it is higher for countries with intermediate level of corruption, while it is low for countries with high or low levels of corruption.

In second place, as far as the relation between inequality and growth is concerned, from the theoretical point of view the classical approach of Stiglitz (1969) defines a positive relation resting on the fact that the saving rate is higher for the rich than for the poor, and therefore the higher the inequality, the higher the aggregate savings, investment and growth. Unlike this approach, the political economic approach stresses the negative impact of inequality on growth because inequalities encourage the disadvantaged population to become involved in rent-seeking activities (Alesina and Perotti, 1994) and leads to social instability (Alesina and Perotti, 1996), reducing growth. Moreover, Galor and Zeira (1993) pointed out that inequality reduces investments in human capital and, assuming that credit constraints are binding, higher inequality reduces growth. Galor and Moav (2004) unified both opposite approaches showing that the relation between inequality and growth depends on a country’s stage of

[1] Nevertheless, Dutta and Sobel (2016) find that corruption hurts entrepreneurship regardless of the previous business climate.

development. From the empirical perspective, it can be shown that in the short run we can have a positive or a negative impact, but in the long run the positive impact vanishes (see Partridge,(2005; Herzer and Vollmer, 2012; and Malinen, 2013). In turn, Lin et al. (2009), Delbianco et al. (2014), and Fawaz et al. (2014) obtain different results depending on the stage of development of each country. Delbianco et al. (2014) stress the role of the income distribution within each country, while Charles-Coll (2015) obtains an optimal rate of inequality.

Although there is a vast literature linking corruption and inequality, and inequality and economic growth, the role of inequality as a channel between corruption and economic growth has been barely explored. In this paper, we focus on this issue including well-tested channels as investment and human capital. Following Hodge et al. (2011), we apply Three Stage Least Square (3SLS) in a wide sample of developing countries.

Section 2 presents the data and an explanatory study of the corruption-growth relationship. Section 3 explains the estimation methodology and model specification. Section 4 shows the results, and section 5 concludes.

2. DATA AND EXPLORATORY ANALYSIS

We use an unbalanced panel of 111 developing countries for the 1980-2013 period (see the list of countries in Appendix-Table 3).[2] The data are transformed into five-years average periods to overcome the unbalanced panel. The variables under study are the growth rate of GDP (Growth), control of corruption (CC), inequality (the Gini coefficient as a general level of inequality, and Share 10, i.e. the share of the top ten percent of the richest population), and the control variables found as robust in Levine and Renelt (1992); which are the ratio of investment to GDP, human capital (HK), population growth (PopG) and openness (i.e. the ratio of exports plus imports to GDP).

Corruption is defined as the abuse of entrusted power for private gain (see Transparency International, 2012). To approximate this variable we use the World Bank's Control of Corruption Indicator (CC), scaled between -2.5 and +2.5, where a higher score means less corruption.

In order to capture the possible relations among variables we carry out an exploratory analysis. Hence, we divided the sample into three k-means clusters defined by the relation between growth, inequality and CC. Then, we project the observations divided by clusters into a biplot, which represents the association between the variables. The cluster under study is summarized in Table 1.

Table 1 shows that, according to the cluster 2, countries with higher growth have lower levels of corruption. Meanwhile, cluster 3 indicates that economies with lower economic growth present an intermediate corruption level, so that there seems to be a non linear relation between corruption and growth. Besides, and not surprisingly, on the average economic growth is positively associated with investment, openness and HK, and negatively with PopG. There is a negative association of growth with the Gini coefficient and Share10; thus, higher inequality should be associated with lower economic growth.

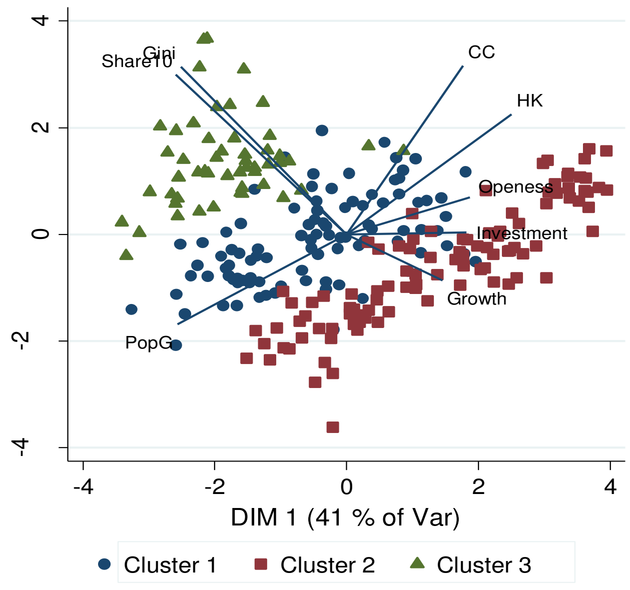
[2] The data were extracted from the World Bank Data Set, except the share of the 10% richest, which was drawn from SEDLAC (Socio-Economic Database for Latin America and the Caribbean).

The biplot is presented in Figure 1, which shows the results of performing a principal component analysis (PCA) –see Appendix-Table 4 and 5- for details. This indicates that the clusters can be grouped in three areas clearly defined into the biplot graph: one of them is more related to investment and HK, the other to inequality, and a third that is between them. Hence, it could infer that there is not a direct association between CC and inequality variables, but an indirect association between CC and economic growth, through HK, Openness and Investment. Finally, there is a negative association between growth and inequality variables.

Table 1. K-MEANS CLUSTER

Clusters	Variable	Obs.	Mean	Std. Dev.	Min	Max
Cluster 1	Growth	124	2.966	2.687	-4.071	11.709
	Share10	125	32.931	2.672	28.2	39.85
	Gini	125	42.291	3.125	37.023	49.61
	Investment	122	21.954	8.306	6.712	61.118
	PopG	125	1.853	1.134	-1.758	4.021
	Openess	125	72.901	30.472	21.869	207.740
	HK	98	5.691	2.838	0.8	12.76
	CC	125	-0.435	0.490	-1.670	0.848
Cluster 2	Growth	124	3.895	3.085	-4.949	19.483
	Share10	124	25.771	2.437	20.366	29.9
	Gini	124	31.875	3.348	22.225	37.465
	Investment	122	23.956	5.921	10.604	46.674
	PobG	124	0.959	1.245	-1.553	3.822
	Openess	123	90.537	34.341	29.581	171.801
	HK	102	7.865	3.508	0.65	13.16
	CC	124	-0.370	0.682	-1.703	1.127
Cluster 3	Growth	58	1.930	1.719	-2.279	5.759
	Share10	59	43.928	4.004	38.18	55.19
	Gini	59	55.140	4.060	49.166	65.27
	Investment	56	19.371	6.120	5.699	40.203
	PopG	59	1.888	0.614	0.772	3.353
	Openness	59	71.416	41.058	16.579	191.090
	HK	55	5.894	1.867	1.8	9.43
	CC	59	-0.388	0.426	-1.421	0.462

Figure 1. Biplot and Cluster Analysis[3]



3. METHODOLOGY

As variables that can explain economic growth also can be influenced by this, instead of estimate a single equation for growth, we specify and estimate a system of equations. This includes Growth, HK, Investment and inequality as dependent variables, while exogenous variables are PopG, openness and CC. The channels through which corruption affects growth, according the literature mentioned above, are investment/GDP, HK, measured as average years of total schooling (15 years or more), and inequality, measured by the Gini coefficient.[4] Finally, in order to capture the convergence effect initial GDP per capita is included.

For the methodology used to estimate this system of equations, following Hodge et al. (2011), we implement a 3SLS.

The better system of equations resulting from the Akaike criterion is:[5]

Growth= f(Gini, Investment, Human Capital, Initial GDP per capita,

Corruption Index, Openness, Population Growth)

Investment= f(Growth, Gini, Openness, Corruption Index)

Human Capital= f(Growth, Gini, Corruption Index)

Gini= f(Growth, Corruption Index, Population Growth)

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[3] The relation among the variables is robust to different specifications of the time dimension. In this work we include the analysis of the whole period under study, but also were made considering the mean of the five-year periods, and considering different quinquenniums.

[4] We select only Gini as inequality measure because there is high correlation between Share10 and Gini coefficient. Besides, results of both variables with GDP growth are very similar.

5 Other specifications are disposable upon request.

Mo (2001) investigates the channels that connect corruption and growth. In his work, the methodological approach is implementing OLS in each equation. Like this approach, we carry out a research about indirect and direct channels, but we take into consideration the feedbacks between equations by using 3SLS.

Finally, following Hodge et al. (2011) we performed the quasi-formal test of exhaustivness provided by Wacziarg (2001). This simple test involves regressing the residual vector obtained from the system estimates of the growth regression on the corruption index. A correlation between the estimated residual and the CC index could indicate that a significant channel has been omitted. The results indicate that there is no significant effect of the CC index over the residuals estimated.

4. RESULTS

Table 2 shows the results. Not surprisingly, they indicate that economic growth is positively affected by Investment and HK. In turn, inequality affects negatively both growth and HK. The first result is compatible with the political economy approach, according to which increasing inequality leads to greater social pressure towards distribution policies. These policies generate distortions that harm physical and human capital accumulation, and then economic growth. Besides, the incentives for such an accumulation are based on the appropriation of private returns, which can be hampered in societies with high inequality and a distributive conflict, reducing once again investment and growth (Delbianco et al., 2014). In relation to the negative impact of inequality on HK, this is compatible with the credit market imperfections approach. In this sense, in presence of credit market imperfections and fixed costs associated with investment in education, occupational choices are affected by the distribution of income. In particular, if the interest rate for borrowers is significantly higher than that for lenders, inequality may result in an under-investment in human capital (Galor and Zeira, 1993).

On the other side, economic growth is negatively affected by CC, a result that is compatible with the "greasing the wheel" approach, explained above. On the contrary, CC affects significantly and positively Investment and HK. Therefore, in terms of the effects of corruption on economic growth, this result is compatible with the "sand in the wheel" approach. Therefore, even though corruption can favor economic growth, this result could be offset by the negative effect on human capital and investment, so that our results are partially compatible with the literature mentioned above: direct effects of corruption on growth are positive, while indirect ones are negative. Finally, Inequality is reduced by economic growth and increased by population growth, which is an intuitive result.

Table 2. 3SLS RESULTS

	Dependent variable			
Variable	**Growth**	**Investment**	**HK**	**Inequality**
Growth		1.251***	0.212***	-0.971***
		(0.127)	(0.064)	(0.222)
Investment	0.255***			
	(0.025)			
HK	0.216***			
	(0.065)			
Gini	-0.044***	-0.037	-0.107***	
	(0.017)	(0.037)	(0.017)	
Y0	-4.36e-06			
	(0.00002)			
CC	-1.274***	2.308***	2.663***	1.504
	(0.313)	(0.588)	(0.281)	(1.065)
Openess	-0.008**	0.028***		
	(0.004)	(0.009)		
PopG	-0.190			2.993***
	(0.167)			(0.536)
Constant	-1.675	18.054***	1.133***	3.980***
	(1.252)	(2.015)	(0.805)	(1.214)

Note: *, ** and ***: 10. 5 and 1% significant respectively.
Standard errors are in parenthesis.

5. CONCLUSIONS

As it was aforementioned, in the literature there is not a clear consensus on the effects of corruption on economic growth. Similarly, in this paper we find eclectic results for a wide sample of 111 developing countries. Direct effects of corruption on growth are positive, while the indirect effects, through investment and human capital channels, are negative. Finally, inequality affects negatively economic growth, result that is compatible with the political economy approach.

Thus, our results are not conclusive about economic policy recommendations in terms of the effect of corruption on economic growth.

Finally, future lines of investigation can be the analysis of direct and indirect effects of corruption on economic growth in the short and in the long run, in order to determine if the effect of corruption on growth is robust at different time horizons.

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APPENDIX.

Table 3. Countries

Afghanistan	Chad	Guatemala	Madagascar	Peru	Thailand
Albania	China	Guinea	Malawi	Philippines	Timor-Leste
Angola	Colombia	Guinea-Bissau	Maldives	Russian Federation	Togo
Argentina	Comoros	Guyana	Mali	Rwanda	Trinidad and Tobago
Armenia	Congo, Dem. Rep.	Haiti	Mauritania	Sao Tome and Principe	Tunisia
Azerbaijan	Congo, Rep.	Honduras	Mexico	Senegal	Turkey
Bangladesh	Cote d'Ivoire	Hungary	Moldova	Serbia	Uganda
Belarus	Croatia	India	Mongolia	Sierra Leone	Ukraine
Belize	Czech Republic	Indonesia	Montenegro	Slovak Republic	United Arab Emirates
Benin	Djibouti	Israel	Morocco	Slovenia	Uruguay
Bhutan	Dominican Republic	Jordan	Mozambique	Somalia	Uzbekistan
Bolivia	Ecuador	Kazakhstan	Myanmar	South Africa	Vanuatu
Bosnia and Herzegovina	Egypt	Kenya	Namibia	Sri Lanka	West Bank and Gaza
Brazil	Estonia	Kyrgyz Republic	Nepal	St. Lucia	Yemen, Rep.
Burkina Faso	Ethiopia	Lao PDR	Nicaragua	Suriname	Zambia
Burundi	Gabon	Latvia	Niger	Swaziland	Zimbabwe
Cambodia	Gambia	Lesotho	Nigeria	Syrian Arab Republic	
Cameroon	Georgia	Liberia	Pakistan	Tajikistan	
Central African Republic	Ghana	Macedonia	Paraguay	Tanzania	

PCA ANALYSIS

Table 4. Eigenvalues

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	**3.26235**	**1.80618**	**0.4078**	**0.4078**
Comp2	**1.45617**	**0.407008**	**0.182**	**0.5898**
Comp3	1.04916	0.206366	0.1311	0.721
Comp4	0.842795	0.163699	0.1053	0.8263
Comp5	0.679096	0.254817	0.0849	0.9112
Comp6	0.424279	0.152745	0.053	0.9642
Comp7	0.271534	0.256915	0.0339	0.9982
Comp8	0.0146198	.	0.0018	1

Table 5. Eigenvectors

Variable	**Comp1**	**Comp2**	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Unexp.
Growth	**0.236**	**-0.141**	0.690	-0.405	0.353	0.399	0.033	-0.005	0
Share10	**-0.421**	**0.486**	0.224	0.010	0.151	-0.081	-0.018	0.712	0
Gini	**-0.409**	**0.510**	0.214	0.013	0.164	-0.090	0.002	-0.702	0
Investment	**0.295**	**0.006**	0.606	0.389	-0.379	-0.497	0.061	0.000	0
PobG	**-0.417**	**-0.274**	0.125	0.353	-0.180	0.396	0.650	-0.004	0
Openess	**0.304**	**0.113**	-0.072	0.707	0.591	0.187	-0.077	0.010	0
HK	**0.407**	**0.365**	-0.197	-0.238	0.139	-0.196	0.740	0.023	0
mcorr	**0.287**	**0.513**	-0.019	0.065	-0.530	0.591	-0.139	0.001	0

Note

The first two components explain 59 % of the variance of the data, and the first three components have eigenvalues greater than unity. Also in the table of eigenvectors, the linear combination of the data generated by each component is shown (to view these results, a strategy is the Biplot graph presented in the text).
MSA test results greater than 0.5 for all observations. In particular they throw all statistical variables that are greater than 0.70, except those of inequality that have values greater than 0.60. Both tests of independence as LR sphericity chi^2 results with high values (1294 and 1297 respectively) yielding p- values less than 0.01, and therefore also conclude for the correct specification of the PCA.