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Corruption and Income

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Abstract

This paper examines whether countries with higher income have less corruption. Earlier studies, utilizing pure cross-section regressions, establish a strong association between income and corruption but do not consider factors (presumably, long-run historical factors) that simultaneously could affect both variables. Employing fixed effects methodologies and thus controlling for such factors, we show that the statistical association between income and corruption disappears.

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1. Introduction

Many studies have considered associations between corruption and economic growth, albeit with mixed findings. Leff (1964) and Huntington (1968) argue that corruption might promote growth under certain types of mechanisms. First, corruption might be used as "speed money" that could avoid delays due to bureaucratic red tape ("It greases the wheels"). Second, corrupt employees may work harder since bribes create incentives for greater work effort[1]. On the contrary, in recent years, most of the empirical work shows that corruption is anti-growth[2].

In this paper we revisit the corruption empirical literature by examining the direction of causality between income per capita and corruption. While both income and corruption are highly correlated, as shown in Figure 1, existing work does not establish causation. More recent studies, using pure cross-section analysis, argue that the direction of causality runs from income to corruption. Most of these studies, however, fail to account for factors that could simultaneously affect both variables. Treisman (2000), for example, shows that high income countries are more likely to be less corrupt than low income ones[3]. In this seminal work, Treisman (2000), is utilizing cross country variations to identify long-run patterns[4]. A possible problem from this methodology could arise from omitted variable bias and reverse causality. Also, a cross-country sample does not utilize the within country variation in the degree of corruption and income. A panel methodology can exploit such variation. Yet, there is little empirical work testing the association between income and corruption using panel techniques.

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[1] See also, among others, Friedrich (1972), Nye (1989).
[2] See, e.g., Mauro (1995), Ehrlich and Lui(1999), Mo (2001), Meon and Sekkat(2005).
[3] See Shleifer and Vishny (1993), La Porta et al. (1999).

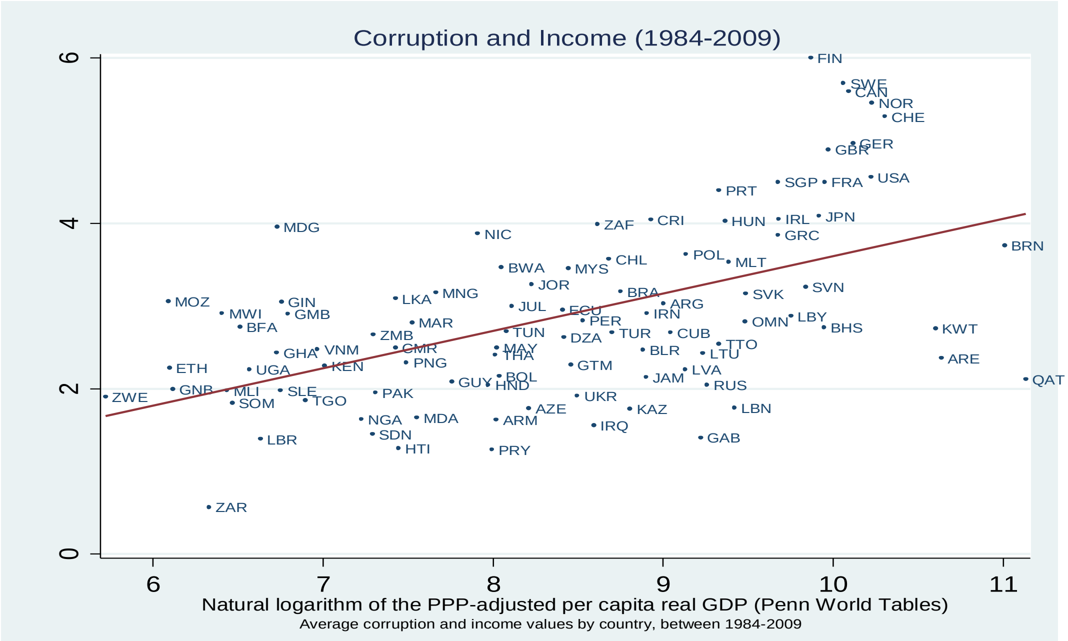

Figure 1. Income per capita and international country risk guide measure of corruption. The data on income and corruption are averaged from 1984 to 2009. The corruption indicator ranges from 0 to 6, higher numbers indicate lower levels of corruption.

Consequently, the empirical analysis performed in this study follows a fixed effects panel data model that would allow us to examine the within-country variation, that is, to explore whether a country is more likely to be less corrupt as it becomes richer. Controlling for time invariant heterogeneity is particularly critical. Presumably, our fixed effects model can capture long run historical factors that could have promoted both income and the extent of corruption. Our results suggest that while there is a significant association between corruption and income, this association disappears when country-specific fixed effects are taken into account.

2. Data

We use annual panel data for 135 countries during the period 1984-2009. Nevertheless, we also estimate our model by averaging the data over 5 years to smooth out business cycle effects. The dependent variable, (CORRUPTION), is taken from Political Risk Services, a private firm that annually publishes the International Country Risk Guide (ICRG). The corruption index is based on the opinion of experts and captures the degree to which "high government officials are likely to demand special payments" and to which "illegal payments are generally expected throughout lower levels of government in the form of bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans." ICRG classifies countries on a scale from 0 to 6, with 0 indicating higher levels of corruption. We use the ICRG data since it is available for more years than other measures of corruption. However, to check the robustness of our findings, we use alternative measures of corruption that have been widely used in the literature. We use the corruption indicator from the World Bank's World Governance Indicators (WGI) constructed by Kaufmann et al. (1999). While it is available for more countries than the ICRG index, it only begins in 1996. It ranges from -2.5 to +2.5 where lower numbers denote more corruption. As an alternative measure, we use the Corruption Perception Index compiled from Transparency International (CPI), starting from 1995. The CPI ranks countries on a scale 0 (high corruption) to 10 (low corruption). All three indicators are subjective measures of corruption[5].

Finally, the natural log of real GDP per capita (INCOME) comes from the Penn World Tables[6], version 6.3.

3. Model

We consider the following panel specification:

$$\mathrm{CORRUPTION}_{i,t} = \delta(\mathrm{CORRUPTION})_{it-1} + \zeta(\mathrm{INCOME})_{it-1} + \alpha_i + \eta_t + \varepsilon_{i,t} \quad \text{-------------------------} \; (1)$$

where the dependent variable $\mathrm{CORRUPTION}_{i,t}$ measures the level of corruption in country i at time

[5] Although, not perfect measures of corruption, the above indicators are highly correlated. See Swaleheen (2011) for a comprehensive discussion on these measures.
[6] We also use the Maddison data (which is only available up to 2008) and results do not appear to change.

t, $\mathrm{CORRUPTION}_{it-1}$ is the lagged value of corruption which captures persistence in corruption, INCOME_{it-1} is the lagged natural log of real GDP per capita, and ε is the error term where $E(\varepsilon_{i,t}) = 0$ for all i, t. The intercepts α_i and η_t indicate country and year fixed effects in order to control for time-invariant factors specific to a country as well as global shocks that influence all countries similarly. The use of fixed effects, however, does not necessarily identify the causality between corruption and income. Fixed effects models go far to solve the endogeneity problem to the degree that corruption and income are determined by time-invariant factors. Additionally, the inclusion of a lagged dependent variable in the right hand side increases the potential for biased coefficient estimates.

Therefore, to mitigate the above concerns, we estimate (1) using the system-GMM from Blundell & Bond (1998) which improves on the Arellano & Bond (1991) difference GMM estimator[7]. For the new specification, lagged corruption and income are assumed to be endogenous. Thus, we use the second lags of these variables as instruments.

Table 1
Panel Data Regression Results

Panel A: Coefficient Estimates	Results Using the ICRG Measure of Corruption								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Data	Annual	Annual	Annual	5-year	5-year	Annual	Annual	5-year	5-year
Estimation Method	OLS	F.E	GMM	F.E	GMM	F.E	GMM	F.E	GMM
Sample of Countries	All	All	All	All	All	No High Income	No High Income	No High Income	No High Income
CORRUPTION (t-1)	0.94	0.84	0.99	0.49	0.79	0.85	0.93	0.50	0.77
	(0.00)***	(0.01)***	(0.00)***	(0.03)***	(0.04)***	(0.01)***	(0.01)***	(0.03)***	(0.05)***
INCOME (t-1)	0.02	-0.01	0.01	-0.14	0.06	-0.02	0.02	-0.18	0.02
	(0.00)***	(0.05)	(0.02)	(0.18)	(0.06)	(0.05)	(0.02)	(0.17)	(0.06)
AR (2) Test			0.09		0.08		0.09		0.08
Hansen J test			0.32		0.11		0.59		0.29
Observations	3267	3267	3267	731	731	2703	2703	602	602
Number of countries	135	135	135	135	135	113	113	113	113
R-squared (within)	0.78	0.80		0.48		0.80		0.47	

Notes: Robust standard errors in parentheses: * significant at 10%, ** significant at 5%, *** significant at 1%.
The system GMM estimates are obtained from the following system of equations:
$\mathrm{CORRUPTION}_{i,t} = \delta(\mathrm{CORRUPTION})_{it-1} + \zeta(\mathrm{INCOME})_{it-1} + \alpha_i + \eta_t + \varepsilon_{i,t}$ and
$\Delta\mathrm{CORRUPTION}_{i,t} = \delta\,\Delta(\mathrm{CORRUPTION})_{it-1} + \zeta\,\Delta(\mathrm{INCOME})_{it-1} + \Delta\eta_t + \Delta\varepsilon_{i,t}$
Except column 1, all remaining ones include time period effects.

[7] For a detailed discussion see Roodman (2006).

4. Empirical Results

Table 1 presents the main results using the ICRG measure of corruption. As a starting point, we estimate equation (1) with a pooled OLS regression. As shown in column 1 of Table 1, when we do not control for country and time fixed effects the coefficient estimate on income is positive and statistically significant. This conforms to the findings of Treisman (2000) where he suggests that the lower the income level the higher the corruption. However, as reported in column 2, once fixed effects are controlled for, the statistical association between income and corruption disappears. This result is consistent with our hypothesis. When we allow for time-invariant heterogeneity, probably historical factors that could have promoted both income and corruption, the coefficient estimate upon income is no longer significant. Yet, a fixed effects methodology cannot guarantee causality as there might be time-varying omitted factors that could potentially affect both income and corruption. Therefore, column 3 of Table 1 presents the results obtained when the system GMM estimator is exploited. Again, the income coefficient is statistically insignificant at all levels. In columns 4 and 5 we repeat specifications 2 and 3, respectively, but consider 5 year windows instead of annual ones. Similar to our previous estimations the coefficient estimates for income remain insignificant.

Following, columns 6 and 7 repeat the specifications in column 2 and 3 but remove high income countries from the analysis. Again, the results do not reveal a statistical association between corruption and income. Coefficient estimates are similar when we simultaneously use 5 year windows and remove high income countries, as shown in columns 8 and 9.

Panels A and B of Table 2 replace the corruption variable from ICRG with those from WGI and CPI, respectively, and repeat the specifications in Table 1. Although these indicators are available for fewer years than the ICRG one, the findings remain unchanged.

Table 2
Panel Data Regression Results

Panel A: Coefficient Estimates	Results Using the WGI Measure of Corruption								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Data	Annual	Annual	Annual	5-year	5-year	Annual	Annual	5-year	5-year
Estimation Method	OLS	F.E	GMM	F.E	GMM	F.E	GMM	F.E	GMM
Sample of Countries	All	All	All	All	All	No High Income	No High Income	No High Income	No High Income
CORRUPTION (t-1)	0.97	0.54	0.87	0.08	0.61	0.54	0.84	0.09	0.75
	(0.00)***	(0.03)***	(0.09)***	(0.03)***	(0.14)***	(0.03)***	(0.08)***	(0.04)***	(0.11)***
INCOME (t-1)	0.01	0.04	0.11	0.14	0.21	0.01	0.08	0.14	0.12
	(0.00)***	(0.06)	(0.08)	(0.10)	(0.13)	(0.06)	(0.07)	(0.10)	(0.09)
AR (2) Test			0.16		0.29		0.10		0.29
Hansen J test			0.61		0.48		0.29		0.10
Observations	1197	1197	1197	342	342	1043	1043	297	297
Number of countries	171	171	171	171	171	149	149	149	149
R-squared (within)	0.31	0.32		0.14		0.33		0.13	
Panel B: Coefficient Estimates	Results Using the CPI Measure of Corruption								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Data	Annual	Annual	Annual	5-year	5-year	Annual	Annual	5-year	5-year
Estimation Method	OLS	F.E	GMM	F.E	GMM	F.E	GMM	F.E	GMM
Sample of Countries	All	All	All	All	All	No High Income	No High Income	No High Income	No High Income
CORRUPTION (t-1)	0.96	0.56	0.85	0.22	0.93	0.51	0.86	0.15	0.97
	(0.00)***	(0.03)***	(0.00)***	(0.06)***	(0.05)***	(0.04)***	(0.05)***	(0.06)**	(0.07)***
INCOME (t-1)	0.04	0.20	0.12	0.49	0.11	0.27	0.03	0.25	0.12
	(0.00)***	(0.13)	(0.13)	(0.63)	(0.11)	(0.17)	(0.11)	(0.21)	(0.11)
AR (2) Test			0.59		0.23		0.36		0.15
Hansen J test			0.22		0.20		0.27		0.11
Observations	1142	1142	1142	265	265	889	889	221	221
Number of countries	156	156	156	156	156	134	134	134	134
R-squared (within)	0.45	0.39		0.29		0.35		0.47	

Notes: Robust standard errors in parentheses: * significant at 10%, ** significant at 5%, *** significant at 1%.
The system GMM estimates are obtained from the following system of equations:
$\text{CORRUPTION}_{i,t} = \delta(\text{CORRUPTION})_{it-1} + \zeta(\text{INCOME})_{it-1} + \alpha_i + \eta_t + \varepsilon_{i,t}$ and
$\Delta\text{CORRUPTION}_{i,t} = \delta\,\Delta(\text{CORRUPTION})_{it-1} + \zeta\,\Delta(\text{INCOME})_{it-1} + \Delta\eta_t + \Delta\varepsilon_{i,t}$
Except column 1, all remaining ones include time period effects.

5. Concluding Remarks

The existing literature on corruption suggests that the higher the income level the lower the corruption. In contrast to this view, this study argues that it is less likely that rising income leads to lower levels of corruption. Although data reveal a positive association between the two, this association disappears once country-specific factors are taken into account. This result suggests that being a high income country does not necessarily lower corruption. This is not to say that income has no effect on the level of corruption. But, perhaps, historical factors play a more important role in determining the extent of corruption in a country.

Of course, weaknesses of our methodology also arise. First, the corruption data is only available from 1984 onwards. Although our results reveal no causality between income and corruption, it does not necessarily mean that these results would have been robust over longer time horizons. Second, our methodology does not formally examine which historical aspects are more relevant in the incidence of corruption. Trying to better uncover these associations could explain the association between income and corruption as the corruption literature employing cross-country regressions suggests. We leave this for future research.

6. References

Arellano, Manuel, and Bond, Stephen. (1991) "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies* 58, 277-97.

Blundell, Richard and Bond, Stephen. (1998) "Initial conditions and moment restrictions in dynamic panel data models," *Journal of Econometrics* 87, 115-143.

Ehrlich, Isaac, and Lui, Francis. (1999) "Bureaucratic Corruption and Endogenous Economic Growth," *Journal of Political Economy 107*,270-293.

Friedrich, C. S. (1972). The pathology of politics: violence, betrayal, corruption, secrecy and propaganda New York: Harper and Row.

Huntington, Samuel. (1968) *Political Order in changing societies*. New York: Yale University Press.

La Porta, Rafael, Lopez-de-Silanes, Florencio, Shleifer, Andrei, and Vishy, Robert. (1999) "The Quality of Government," *Journal of Law, Economics and Organization* 15, 222-279.

Leff, Nathaniel. (1964) "Economic Development through Bureaucratic corruption," *The American Behavioral Scientist* , 8-14.

Mauro, Paolo. (1995) "Corruption and Growth," *Quarterly Journal of Economics* 110, 681-712.

Méon, Pierre-Guillaume, and Sekkat, Khalid. (2005) "Does corruption grease or sand the wheels of growth?" *Public Choice* 122, 69-97.

Mo, Pak Hung. (2001) "Corruption and Economic Growth," *Journal of Comparative Economics* 29, 66-79.

Nye, J. S. (1989). Corruption and political development: a cost benefit analysis. American Political Science Review, 61(2), 417–427

Roodman, David. (2006) "How to do xtabond2: An introduction to difference and system GMM in Stata," *Center for global development* No.103.

Shleifer, Andrei, and Vishny, Robert. (1993) "Corruption," *The Quarterly Journal of Economics* 108, 599-617.

Swaleheen, Mushfiq Us, and Stansel, Dean. (2007) "Economic Freedom, Corruption, and Growth," *Cato Journal* 27, 343-358.

Treisman, Daniel. (2000) "The causes of corruption: a cross-national study." *Journal of Public Economic* 76, 399-457.