The effect of corruption on income inequality: a comparative analysis of Europe and South America

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Abstract: The main focus of this paper is to empirically test the relationship between corruption and income inequality in Europe and in South America. Corruption and Income inequality are major issues in third world countries and this relationship has been extensively studied in the last couple of decades. However, to the best of our knowledge, no study has compared the strength of this relationship in Europe and in South America. We use fixed effects panel data model to analyse this relationship from 1996-2016 in Europe, South America, and over 190 countries of the world. Our results show that corruption has significant impact on income inequality in a panel of 190 countries. We also found that this relationship was more pronounced in South America than in Europe. An important implication of this paper is that corruption impacts developing countries more than it does developed countries.

1. Introduction

Rousseau said that the legitimacy of a government derives from the will of the people. Its power comes from peoples trust and when this power deviates from the right track or is misused, corruption becomes a problem. Corruption can be seen as "the abuse of public office for private benefits" (Gupta et al., 1998). It has existed for centuries in different eras and is not a recent phenomenon, but the literature on the topic has expanded in last few decades. The research on this topic has varied from its definition, measuring methodology, to its impacts on people and society in general. Studying the economic and social effects of corruption empirically, using new methods and measurement techniques, has made it very relevant for public policy debates today (Heinrich, 2011).

Corruption is present in all societies, but in some it prevails at every level of the hierarchy. There are many problems associated with corruption. It shatters trust, legitimacy and confidence of people in public institutions. It also negatively affects domestic investment and tax revenues, thus impacting the efficiency of a society. Moreover, it also makes it difficult for firms to sustain themselves in the short run and grow in the long run, by imposing additional costs on them. It also puts pressure on the environment, when corruption is used to enhance pollution related activities. Apart from that, it has also led to many conflicts in different parts of the world. Directly linked to this is the problem of income inequality, which severely affects poor people (Menocal, 2015).

In recent times there have been many scandals shedding light on the magnitude of corruption and how it impacts inequality. The Paradise papers and Panama Papers showed how money is laundered by elite

and the Azerbaijani Laundromat scheme exposed how UK registered shell companies were involved in laundering huge sums of public money through global financial system. At country level, everyday petty corruption is also a major concern for policy makers. For example, in Zimbabwe vaccination for babies was denied unless an illegal consultation fee was paid; and in Cameroon children were thrown out of school for not paying illegal fees to their head teacher. The poor can't afford to pay bribes to access public services or legally free services, which means that they are the most marginalized and suffer the most in every society. This suggests how grand as well as petty corruption leads to inequality (Russell-Prywata, 2017).

Income inequality is a major issue in third world countries, as it causes social problems and also impacts economic growth. It not only leads to poverty and unemployment, but also causes social unrest and instability (Education Bureau, 2015). Moreover, it also correlates with health and social problems, as it puts people under 'status anxiety', which arises when people are placed in a hierarchy that leads to status competition and causes stress (Rowlingson, 2011). Therefore, it is imperative that income inequality is studied with great care, and this paper tries to do that using its empirical relation with corruption.

According to You and Khagram (2005), wealthy have greater motivation and opportunities to engage in corruption, and poor have less chances of making the elite accountable, which further increases inequality. Moreover, poor also have to pay higher percentage of their incomes in bribes when compared to the rich people. Gyimah-Brempong (2002) also found that corruption hurts poor people more than it does the rich in African countries. Following this reasoning, this paper first attempts to study the relationship between corruption and income inequality, and then provides comparative analysis of this relationship between the developed countries of Europe and the underdeveloped countries of South America. The reason for choosing these two continents is that one is a rich continent and the other is a poor one. This provides us with the opportunity to analyse how corruption impacts income inequality in rich countries and in poor countries. Based on this rationale, this paper tests the following hypothesis:

Hypothesis 1: Corruption has positive and statistically significant impact on income inequality.

Hypothesis 2: The impact of corruption on income inequality would be more pronounced in South America than in Europe.

The paper proceeds as follows. Section 2 discusses literature on the link between corruption and inequality. Section 3 provides data and methodology. Section 4 shows the results of panel data analysis, before conclusion in Section 5.

2. Overview of literature.

The general viewpoint is that more corruption leads to more income inequality. Several studies have been conducted in developed as well in developing countries to establish this relationship. Using different econometric techniques, these studies find the direct and indirect relationship between these variables in Asia, Africa and in other regions. Apart from some, most of them find significant causal relationship between the two interest variables.

Many scholars found the relationship between these two variables to be significant in different regions of the world. Policardo et.al (2019) used data on 34 OECD countries to find the positive and significant impact of corruption on income inequality. Khan (2021) used balanced panel data to find the same relationship in 23 emerging countries from 1996 to 2017. Moreover, Basna (2019) found the relationship to be positive and significant in in post-communist European countries.

Several studies have also looked at this relationship in specific countries. Awan et.al (2020) used time series data on Pakistan from 1980 to 2013 to find that corruption had positive and significant effect on income inequality in the long run, but positive and insignificant effect in the short run. Furthermore, Nguyen et.al (2020) used 2SLS-GMM model and balanced panel data from 2011-2018 to find positive and significant impact of corruption on income inequality in 63 cities of Vietnam. Finally, Abiloro et.al (2019)

found that corruption and inequality had negative and significant impact on economic development in Nigeria.

Gupta et.al (1998) used cross section analysis from 1980-97 to show that rising corruption leads to increase in income inequality and poverty, and this impact is considerable. Corruption impacts inequality through different channels; these channels include the negative impact of corruption on economic growth, on effectiveness of social spending, and on formation of human capital among other things. They used various indices of corruption to find this relationship for countries at different stages of development and with different growth experiences. Their paper shows positive correlation between the variables, i.e. a one standard deviation increase in corruption leads to 11 points increase in Gini coefficient and a 7.8 percent decrease in income growth of poor. They use robustness tests and sensitivity analyses to verify the findings. They also suggest that negative impacts of corruption can be reduced through sound management of natural resources, labor intensive growth, spending on education and health among other things. Hence, policies targeting corruption would reduce inequality as well.

Another important contribution in this research stream is by You and Khagram (2005). Using CCI and CPI as measures of corruption level and data from 129 countries, they found that there was strong correlation between the two variables through material and normative mechanisms. Using world values surveys data, they found that inequality also affects norms and beliefs about corruption, with poor accepting corruption as acceptable behaviour (Jong-sung, 2005).

Moreover, Gunalp et.al (2012) also found a similar relationship in US states. Instead of using conventional measures of corruption, they used the number of public officials convicted in a state for corruption related crimes to examine differences in income inequality across US. They found robust evidence that increase in corruption increased income inequality in United States. Similarly, Gyimah-Brempong (2002) used panel data from African countries to investigate effect of corruption on economic growth and income distribution. Their results indicated a positive correlation between corruption and income inequality. Their analysis leads to the conclusion that a combined effect of a decrease income growth and increased inequality hurts poor people the most.

Another research study was conducted using panel data from 61 countries at different stages of economic development to find effect of corruption on income distribution. The study used two measures of corruption to find significant regional differences in distributional impacts of corruption. The study further found that Latin American countries were greatly affected by corruption, followed by African and Asian countries.

Dzhumashev (2012) proposed a theoretical model to find the direct and indirect impact of corruption on inequality. From the perspective of direct impact, the study explains the empirical findings by using a theoretical model that shows the direct impact of corruption on inequality by creating productivity and income disparities amongst agents. Similarly, the study also expresses indirect impact of corruption on inequality by reducing private productivity. Using the cost and benefit analysis of corruption for private agents and bureaucrats, heterogeneity across agents w.r.t corruption-induced productivity gains causes increase in inequality.

Another interesting hypothesis is to find whether its income equality or control of corruption that explains economic growth. Matti (2015) uses standard OLS multiple regression analysis of data from 134 countries to find this relationship. The study finds that a decrease in corruption increases inequality and reduces economic growth. Using 10 different models, the study concludes that inequality harms growth even after controlling for corruption. However, the author also points out that the study could not find spurious relationship between inequality and subsequent growth, which the theory supports.

3. Empirical Analysis.

3.1. Data and Variables.

Multiple sources have been used to collect the data used in these analyses. The dependent variable is "Income Inequality" and main interest variable is Corruption. Other control variables are mainly taken from research done by Mallaye et al. (2015) and Kaasa (2005). Several transformations have been made to the variables to get meaningful results.

3.1.1. Income Inequality.

Income inequality measures how evenly or unevenly income is distributed amongst the population of a country. Frederick Solt provides data on The Standardized World Income Inequality Database (SWIID) used in this analysis. There are several measures of income inequality provided in this dataset, but we use Gini indices of disposable (post-tax, post-transfer) income data for 192 countries. This dataset is better than other alternative datasets because of its wide coverage, as it provides broad cross-national research on income inequality (Solt, 2016).

3.1.2. Corruption.

Our main interest variable is Corruption. According to Transparency International, corruption is "the abuse of entrusted power for private gain". They classify corruption into grand, petty, and political corruption, contingent on the amount of money lost and the sector involved.

We use a proxy "Control of Corruption" provided by World Governance Indicators to capture the impact of corruption in countries. Multiple data sources have been used to construct this index. The variable ranges from -2.5 for high corruption to 2.5 for low corruption. To make interpretation simple, the variable has been reversed. So, 2.5 would mean high corruption and -2.5 would be low corruption.

3.1.3. Government Effectiveness.

Another variable we control for is Government effectiveness, which involves the exercise of authority in a country through traditions and institutions. It is estimated using six different indicators of Worldwide Governance Indicators, and Government Effectiveness is one of the indicators. According to World Bank "Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies".

3.1.4. Social Insurance.

Another important control variable is "Benefit incidence of social insurance programs to poorest quintile" i.e. it includes the percentage of total social insurance benefits received by poorest 20% of population. This indicator is taken from World Bank and is based on national representative household surveys. The variable is estimated using social insurance programs like old age contributory pensions, social security, and health insurance benefits. If there are more benefits received by the poorest quintile in a country, then it would have a positive impact on reducing inequality.

3.1.5. Other Variables.

Several other variables are also controlled for in the panel data model, taken from Mallaye et al. (2015). These variables include inflation, secondary education, openness, GDP per capita, and demographic effects. The data for these variables is constantly updated by World Bank in its database of World Development Indicators (WDI). To measure these effects, several Proxies are used: Trade (% of GDP) is used to measure how open a country is; labour force participation rate is used to measure demographic effects; consumer price index (CPI) is used to compute inflation rate in a country; and variable secondary completion rate is used to measure education level i.e. number of new entrants in the last grade of secondary education. Moreover, to normalize data, GDP per capita is log transformed. These proxies and transformations are in line with literature and are also consistent with econometric methods.

3.2. Methodology.

The empirical approach used in this paper involves finding the relationship between corruption and income inequality in Europe, South America, and 190 countries of the world over 1996-2016 using fixed effects panel data model. The basic regression model has the following form:

$$Inequality_i = \alpha + \sum_{j=1}^{k} \beta_j X_{j,i} + \delta_1 Corruption_i + \varepsilon_i \qquad (1)$$

In this equation, the dependent variable is Inequality$_i$, which basically is gini index of post-tax disposable income extracted from Standardized World Income Inequality Database (SWIID). Corruption is the main interest variable, and X$_{j,i}$ are k exogenous control variables affecting income inequality. The constant is taken as α and ε$_i$ is the error term.

The decision to use fixed effects method was based on Haussmann test. The test's p-value suggested rejecting null hypothesis, which meant using fixed effects model due to its consistency. This model uses the identifying assumption that factors affecting LHS and RHS of the equation are time-invariant; this removes omitted variable bias. The country fixed effects like Culture, Geography, or history are taken as time-invariant in fixed effects model. The method used to do this is called time-demeaning, where we take time-averages for each i and subtract the average values from the model to remove fixed effects.

Several other tests were also used to find the best model. These techniques involved checking for Heteroskedasticity and other important characteristics of the data like stationarity.

4. Results.

The results are shown in Table 1 and Table 2 below, with stars depicting significance level. Both tables predict equation (1) in methodology section using fixed effects panel data model. The strategy used to construct the regression results in Table 1 involves adding one variable at a time, starting with the main interest variable i.e. corruption in Model 1. After that other control variables are added one at a time in each successive model, which shows the individual impact of each variable on the main interest variable and on other control variables added before that. This modelling technique is also followed by other econometricians and is useful to analyse incremental effects of variables.

The results in Table 1 are very interesting. Looking at Model 1, we see that the impact of corruption on income inequality is not significant; however, when we start adding other control variables, we find significant results. Apart from Model 1, all other models show that corruption has statistically significant and positive impact on inequality. This means that as corruption increases, inequality also increases.

Moreover, as we keep on adding control variables, AIC and BIC decreases continuously. According to this criterion, Model 8 is the best model in Table 1. In this model, corruption has positive and statistically significant impact on income inequality. Hence, we fail to reject Hypothesis 1, which hypothesized corruption to have positive and significant impact on income inequality in a panel of 190 counties. This means that as corruption increases in a country, income inequality also rises. Moreover, the directions of other statistically significant variables in Model 8 are also in line with literature. The coefficient of Government effectiveness is statistically significant and negative, which means that as government becomes more effective, inequality decreases. Similarly, the coefficients of school enrolment (secondary), Trade (% of GDP) and log of GDP per capita are also significant and negative, which means that an increase in these variables reduces inequality.

<u>Table 1</u>

Panel results: Income Inequality and Corruption.
Dependent Variable: Income Inequality (Gini Index)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Corruption	0.554	1.659*	3.595***	4.179**	4.152**	4.197**	4.143***	4.277***
	(0.342)	(0.881)	(1.223)	(1.675)	(1.688)	(1.636)	(1.502)	(0.965)
social insurance		-0.187**	-0.193***	-0.311***	-0.313***	-0.318***	-0.328***	-0.0124
		(0.0806)	(0.0705)	(0.0784)	(0.0800)	(0.0794)	(0.0907)	(0.0660)
Government Effectiveness			-4.022***	-4.549**	-4.546**	-4.495**	-4.772**	-2.281**
			(1.468)	(1.973)	(1.979)	(1.881)	(1.875)	(0.945)
School enrollment (secondary)				-0.191***	-0.190***	-0.198***	-0.207***	-0.0867**
				(0.0542)	(0.0544)	(0.0532)	(0.0489)	(0.0424)
Inflation (annual %)					0.00731	0.0295**	0.0291**	0.0235*
					(0.00784)	(0.0122)	(0.0115)	(0.0140)
Trade (% of GDP)						-0.0246*	-0.0253**	-0.0267**
						(0.0122)	(0.0109)	(0.0116)
Labor Force Participation							0.133	0.0541
							(0.135)	(0.0631)
log of GDP p.c								-3.849***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
								(0.809)
Constant	38.06***	41.83***	41.54***	56.23***	56.11***	58.42***	50.76***	78.66***
	(0.0364)	(0.588)	(0.450)	(3.676)	(3.692)	(3.494)	(8.519)	(5.730)
R^2	0.006	0.061	0.198	0.498	0.499	0.512	0.522	0.727
AIC	728.0	606.5	572.0	322.1	323.9	322.0	321.0	242.8
BIC	729.7	613.4	582.3	334.0	338.7	339.8	341.7	266.5
F	2.628	3.351	4.389	37.04	29.57	27.17	33.55	44.93

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

To test hypothesis 2, we predict equation 1 for European and South American countries as well. The results are shown in Table 2, where model 8 shows regression results of a panel of 190 countries; Model 9 shows regression results of European countries; and Model 10 shows regression results of South American countries. Model 9 shows that corruption has positive and significant impact on income inequality in Europe. In this model, government effectiveness is also statistically significant and negative; this means that as government becomes more effective, income inequality decreases. Moving on, Model 10 shows similar results for South American countries i.e. corruption has positive and statistically significant impact on income inequality. Apart from that, social insurance and GDP per capita are also statistically significant. Overall, we also fail to reject hypothesis 2 because the strength of relationship of corruption and income inequality is stronger in South American countries than in European countries. This means that as corruption increases in developing countries of South America, it increases income inequality more than it does in European countries.

Overall, the results are in line with literature. Most control variables in these models are used after taking into account theoretical as well as empirical considerations. The results are promising, as most of the control variables are statistically significant in several models. Most importantly, we find that corruption is a very important factor in explaining income inequality. This result has significant implications for policy making because controlling corruption might help reduce income inequality in a country.

Table 2 Panel results: Income Inequality and Corruption.

Dependent Variable: Income Inequality (Gini Index)

	Model_8 All countries	Model_9 Europe	Model_10 South America
Corruption	4.277***	3.625**	5.010***
	(0.965)	(1.530)	(0.825)
social insurance	-0.0124	-0.146	0.114***
	(0.0660)	(0.242)	(0.0296)
GOV.EFF	-2.281**	-2.752**	-1.082
	(0.945)	(1.090)	(1.420)
School enrolment, (secondary)	-0.0867**	0.0422	-0.0972
	(0.0424)	(0.0801)	(0.0780)
Inflation	0.0235*	0.0356	0.0689
	(0.0140)	(0.0258)	(0.0861)
Trade (% of GDP)	-0.0267**	-0.0503	-0.0170
	(0.0116)	(0.0364)	(0.0263)
Labor force participation	0.0541	0.0965	-0.0390
	(0.0631)	(0.109)	(0.0842)
log of GDP p.c	-3.849***	-0.831	-5.809***
	(0.809)	(1.281)	(0.969)
Constant	78.66***	35.90**	107.1***
	(5.730)	(13.66)	(9.211)
R^2	0.727	0.761	0.878
AIC	242.8	10.59	75.28
BIC	266.5	20.16	88.79
F	44.93	965.14	1075.2

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5. Conclusion.

The paper predicted fixed effects panel data model to find a significant relationship between corruption and inequality. First, data from 190 countries over the period 1996-2016 was used. The regression results show positive and statistically significant relationship between the two variables when other independent variables are controlled for. Second, we ran the same regression model for Europe and South American countries separately. The regression results for both of these continents showed significant relationship between income inequality and corruption. However, the strength of relationship was stronger in the developing countries of South America than in developed countries of Europe.

Many governments around the world encounter problems related to corruption with enormous difficulty. It significantly impedes government's functions and its role in economy by having an impact on allocation of resources, stabilization of economy, and redistribution of income. As this paper showed, corruption has remarkable effect on distributional consequences by affecting both budgetary revenues and expenditures. Therefore, it is very important for policy makers to carefully deal with the issue (Gupta et al., 1998).

The implications from this study lead to the conclusion that government should adopt policies that will build national integrity system. Some basic set of tools to fight corruption include economic and social progress, strong civil society, rule of law under good governance, and democratic values. This will help build a national integrity system to contain and fight corruption at various levels and in various forms. This will ultimately have a significant impact on reducing income inequality (Langseth, 1999).

A further step in research could be the inclusion of interaction terms in the analysis. One such suggestion would be the inclusion of decentralization and corruption as an interaction term and see how it impacts income inequality. This would show whether fiscal and political decentralization would help diminish corruption and inequality.

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