1. Introduction:

Foreign aid has long been seen as a critical tool for promoting development, reducing poverty, and strengthening state capacity in low-income countries. Yet, a persistent question remains: does foreign aid actually achieve these objectives, or does it unintentionally foster corruption and rent-seeking? This question has occupied scholars and policymakers for decades.

The debate is divided. On one side, it is argued that aid provides the fiscal space for governments to invest in health, education, and infrastructure, thereby strengthening long-run growth and governance. On the other side, critics argue that aid often functions as "unearned income," weakening domestic accountability and fueling patronage networks. Empirically, disentangling this relationship is challenging because of causality: aid may influence corruption, but donors may also target more corrupt or fragile states for geopolitical or humanitarian reasons.

This study seeks to address this problem by investigating the causal impact of foreign aid on corruption across a panel of non-OECD countries. Using an instrumental variable (IV) approach, we exploit geographic and cultural proximity to major OECD donors as sources of exogenous variation in aid inflows. By focusing on 3-year averaged data, the analysis smooths out short-term fluctuations and captures institutional changes that evolve slowly over time.

2. Methodology:

• Data and Sample

The study uses a panel dataset of non-OECD aid-recipient countries, as institutional dynamics in these countries differ significantly from OECD donors. The time period is from 1996-2022. Aid outflows are drawn from a set of 10 OECD donor economies (Australia, Belgium, Canada, Denmark, France, Germany, Japan, Switzerland, the UK, and the USA), chosen due to consistent data availability.

The sample of recipients includes major aid-dependent countries such as Afghanistan, Bangladesh, Burkina Faso, Cambodia, Chad, the Democratic Republic of Congo, Ethiopia, Ghana, Haiti, Honduras, Kenya, Lao PDR, Liberia, Madagascar, Malawi, Mali, Mozambique, Nepal, Niger, Nigeria, Pakistan, Papua New Guinea, Rwanda, Sierra Leone, Solomon Islands, Sudan, Tanzania, Uganda, and Zambia.

To smooth out short-term volatility and measurement error, data are aggregated into 3-year averages. This approach is standard in institutional research because variables such as corruption and governance evolve slowly and are better captured by medium-term changes rather than annual fluctuations.

• Variables and Data Sources

The study employs variables drawn from multiple well-established international datasets. From the World Bank's World Development Indicators (WDI) and Governance Indicators, we use measures of corruption, foreign aid inflows (logFA), GDP per capita (logGDP), population (logPop), and public expenditure (logPE), where the latter is defined as general government final consumption expenditure as a percentage of GDP. Aid data are further supplemented with Official Development Assistance (ODA) statistics obtained from the OECD's Development Assistance Committee (DAC). To construct instrumental variables, we rely on the CEPII Gravity Dataset, which provides information on bilateral distance, common borders, and common official language. These are interacted with donor aid outflows to generate the instruments:

ODA_DIS (aid outflows weighted by inverse bilateral distance), ODA_LG (aid outflows weighted by common language dummy), and ODA_Border (aid outflows weighted by border dummy). Finally, we incorporate institutional and structural characteristics from Barro and Lee (1994), including a colony dummy, equal to one if the country was a colony after 1825, and an oil exporter dummy, equal to one for oil-producing countries.

3. Result

• Descriptive Statistics

The summary statistics table reveals that Corruption, has a mean of -0.836. Its histogram shows a distribution that is roughly bell-shaped and centered around the mean.

Foreign Aid, GDP per capita, and Population—exhibit severe positive skewness in their raw form, as evidenced by their high skewness values (2.38, 1.21, and 2.19, respectively) and very large standard deviations relative to their means. To address this non-normality, these variables were transformed using the natural logarithm.

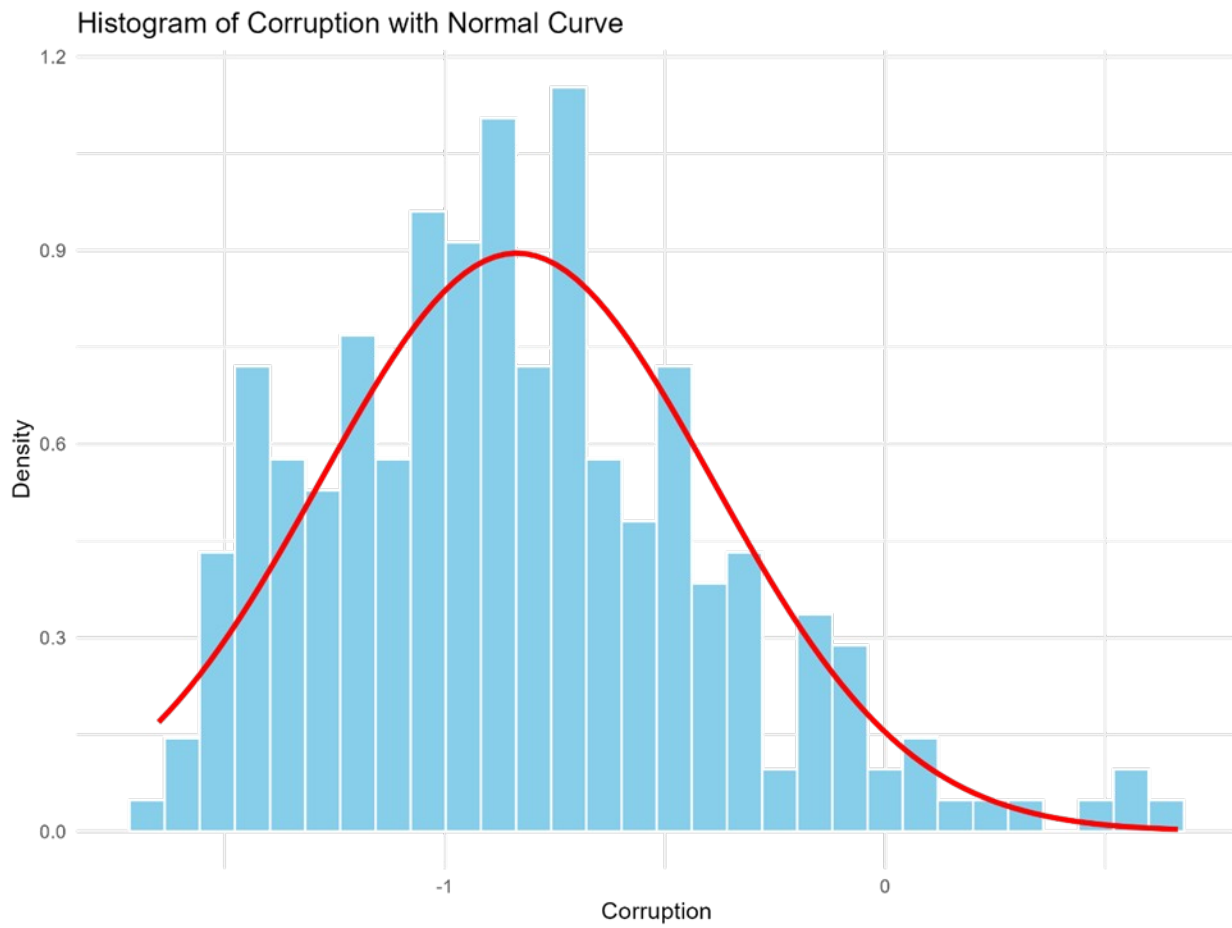
The histograms for the transformed variables, log_FA, log_gdp, and log_pop, confirm the effectiveness of this approach. Each transformed variable now displays a distribution that is approximately normal, with a distinct bell-shaped curve and minimal skew.

The analysis also incorporates several binary control variables. The Colony variable, with a mean of 0.86, indicates that approximately 86% of the countries in the sample are former colonies. Conversely, the Oil variable, with a mean of 0.034, shows that only a small fraction of the sample (3.4%) are oil-producing nations. These variables are important for controlling for fundamental differences in institutional development across countries.

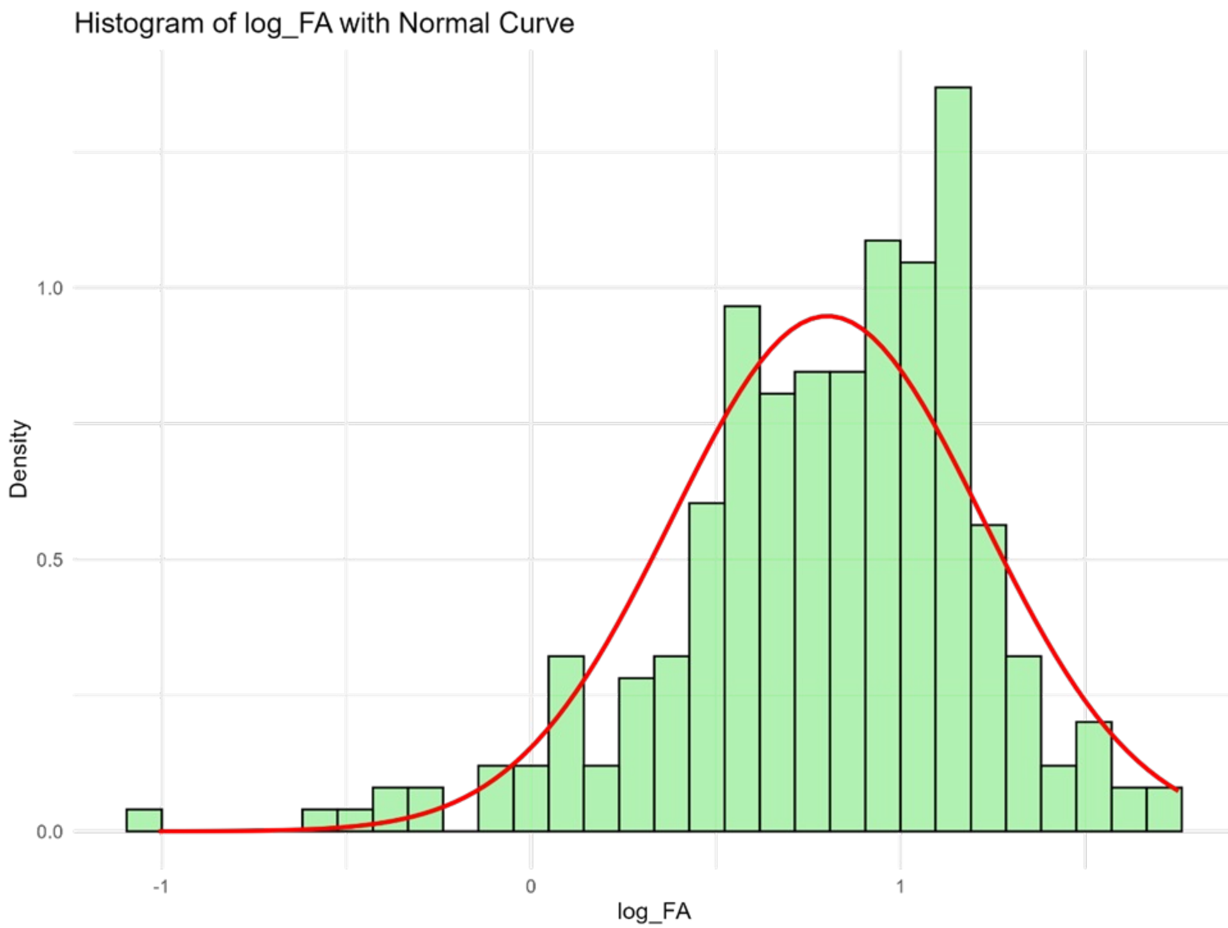
Variable	n	mean	sd	min	max	skew	kurtosis
Corruption	261	-0.83621540	0.4454005	-1.64940739	0.6644784	0.6484458	0.4378427
Foreign_aid	261	9.24557888	8.2257896	0.09807344	56.5135668	2.3826802	8.3174909
GDP_per_cap	261	2,397.12589754	1,464.2468838	386.35275485	8,253.4209217	1.2087204	1.4454829
Colony	261	0.86206897	0.3454901	0.00000000	1.0000000	-2.0879426	2.3686235
Oil	261	0.03448276	0.1828162	0.00000000	1.0000000	5.0732237	23.8289409
Pop	261	37,928,398.34610473	49,948,142.5144271	407,518.00000000	239,393,404.6666667	2.1964031	4.0605009
Public_exp	261	18.89802214	6.5137955	2.49000000	44.7006667	0.8400740	1.6237946
log_FA	261	0.80183707	0.4208657	-1.00844860	1.7521527	-0.8688383	1.4703483
log_gdp	261	3.29978995	0.2725818	2.58698401	3.9166340	-0.2733752	-0.2475153
log_pop	261	7.28907887	0.5264460	5.61014680	8.3791122	-0.3813247	1.1252718
log_PE_wins	261	1.25169369	0.1490439	0.77840153	1.5969654	-0.4018212	0.6644253

• Histograms

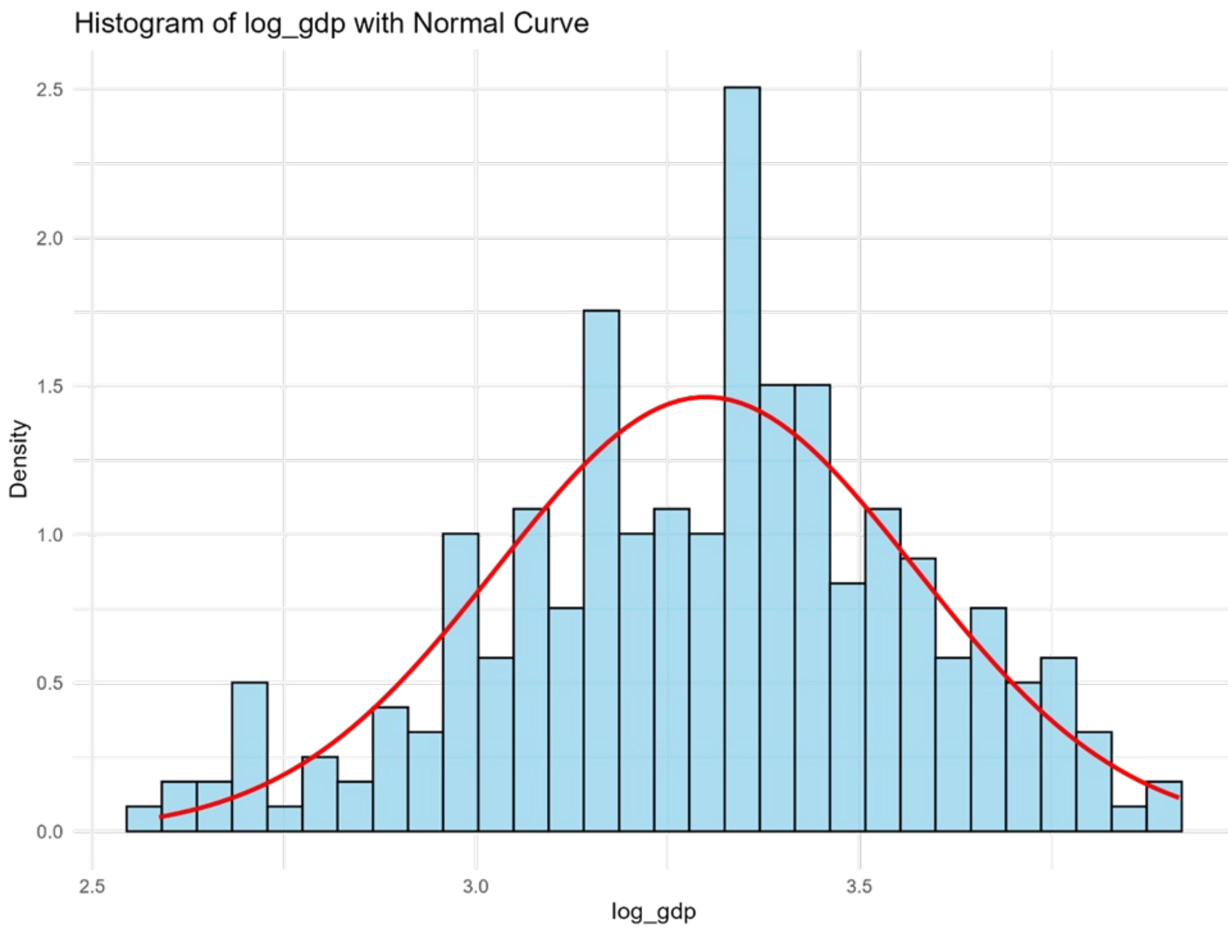
The histogram plots the frequency distribution of corruption variable, with a red curve representing a fitted normal distribution. The distribution is roughly bell-shaped, indicating that a normal curve is fit for the data, but not perfect. The peak of the distribution is centered around a value of approximately -0.8. The distribution shows a slight negative skew, as the left tail extends a bit further than the right, though the kurtosis appears relatively normal.



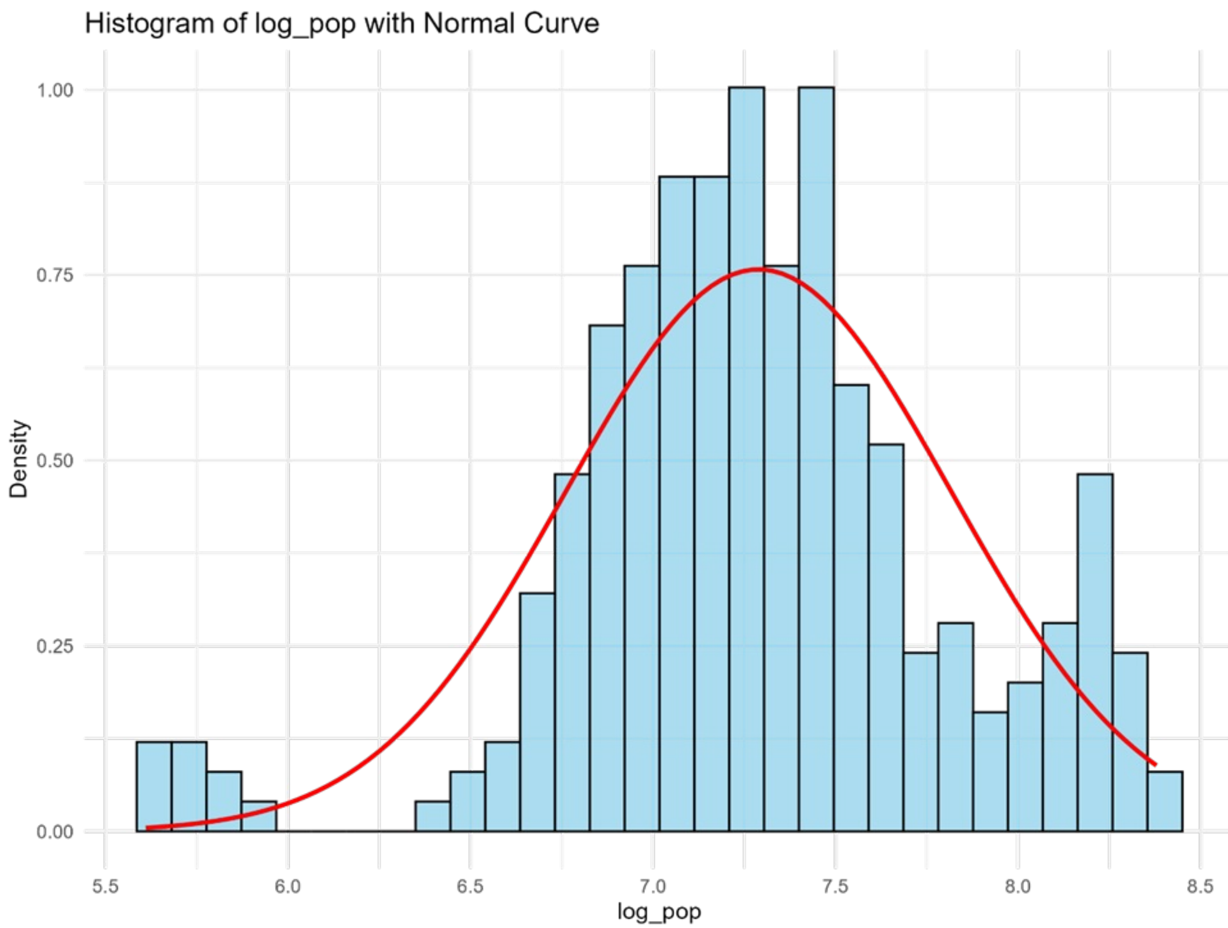
The histogram displays the frequency distribution of the natural logarithm of the foreign aid variable. Unlike the raw foreign aid data, which was likely heavily skewed, this log-transformed variable shows a distribution much closer to a normal curve, as indicated by the superimposed red line. This confirms that the logarithmic transformation successfully addressed the high positive skew and kurtosis found in the original data. The foreign aid values are now more evenly distributed across the sample, with fewer extreme outliers. The distribution is still not perfectly normal, showing a slight negative skew.



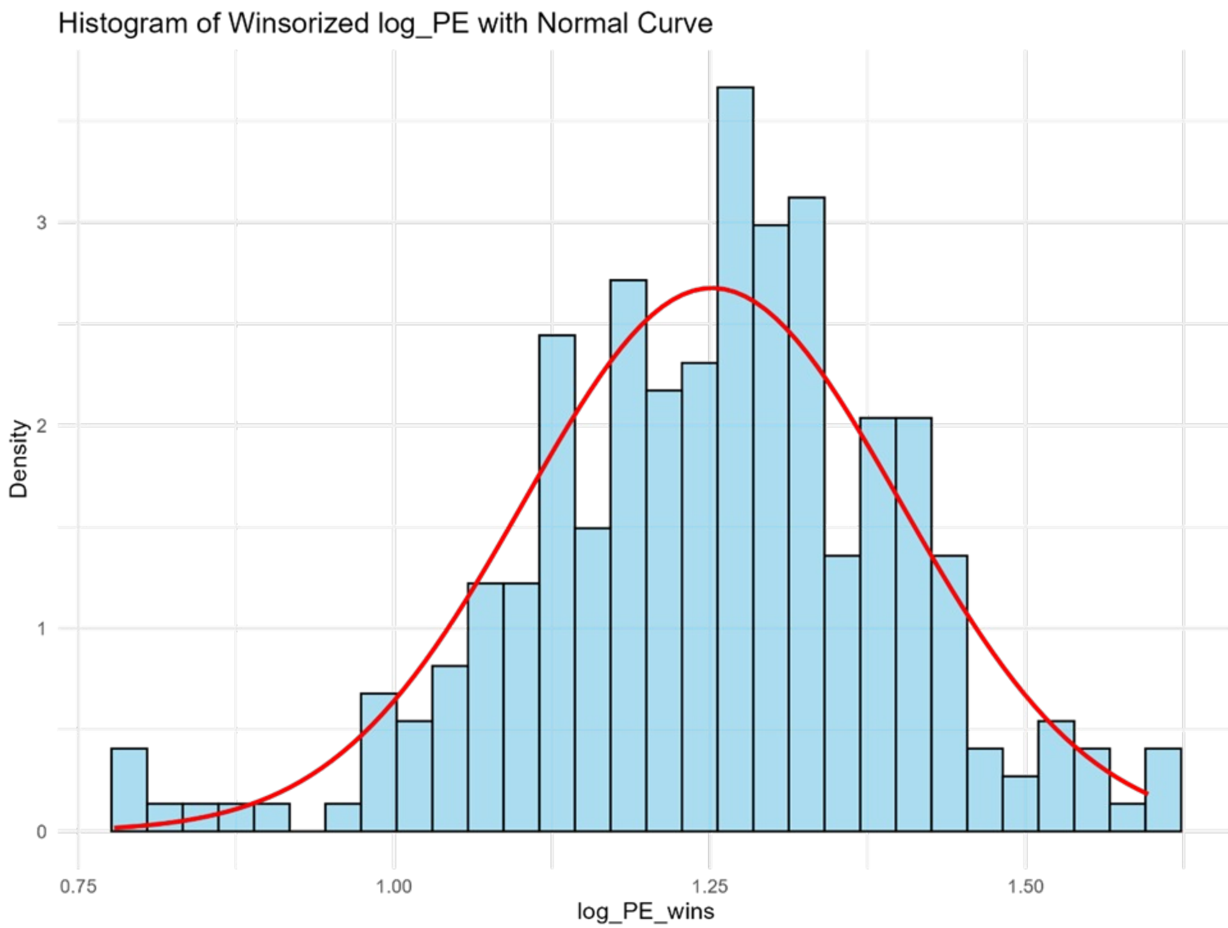
This histogram plots the frequency distribution of the natural logarithm of the GDP per capita. The distribution shows a significant improvement over the highly skewed raw data, as it is now much closer to a normal, bell-shaped curve. The red line, representing a fitted normal distribution, shows that the transformation successfully normalized the data.



This histogram plots the frequency distribution of the log_pop. This transformation has successfully converted the highly skewed raw population data into a more symmetrical, bell-shaped distribution. The red curve, representing a fitted normal distribution, shows that the data follows the general shape of a normal curve reasonably well. The tails on both sides of the peak are less frequent, representing countries with extremely small or large populations.



The histogram for log_PE_wins shows a distribution that is exceptionally well-behaved. The data forms a symmetrical, and bell-shaped curve that fits the superimposed red normal curve. This indicates that the transformation and possible winsorization have successfully addressed any skewness or outliers that were present in the original data.



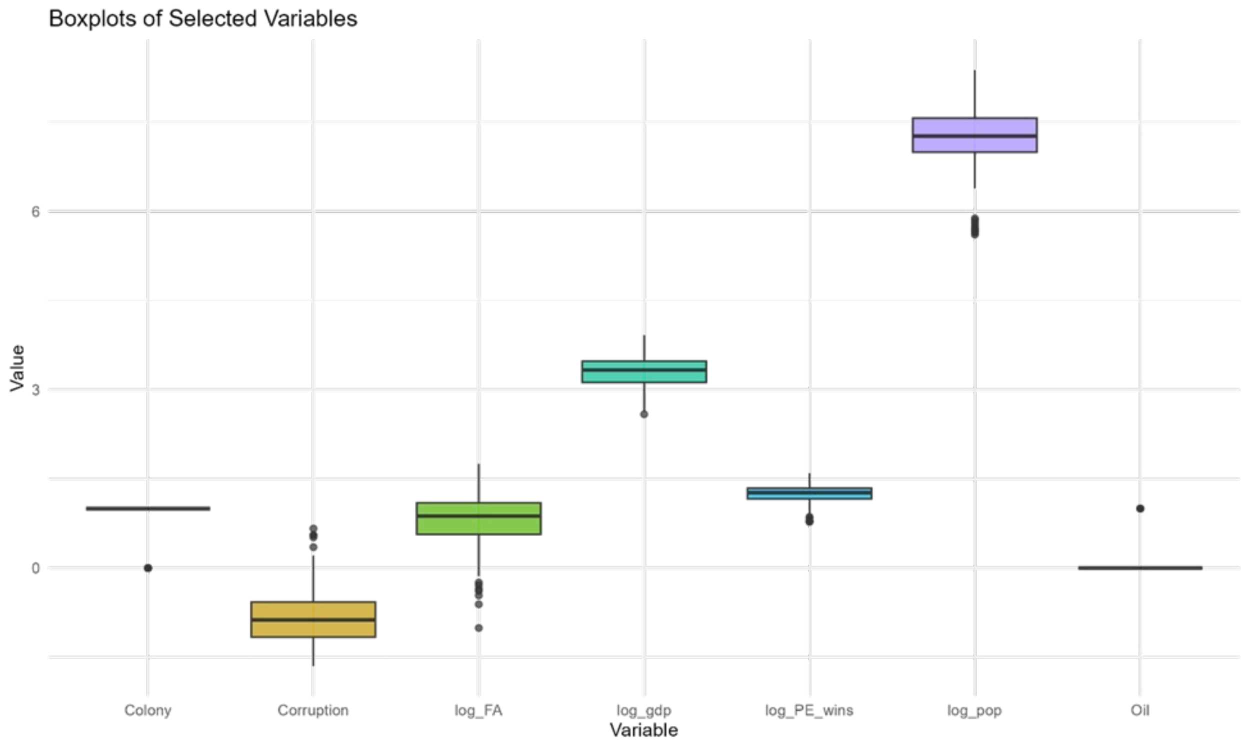
Boxplot Analysis of Selected Variables

The boxplot analysis is a diagnostic tool, confirming the successful data transformations and providing insight into the central tendency, spread, and outlier for each variable.

The boxplot for Corruption, is relatively symmetrical, with the median line positioned near the center of the box. The presence of a few individual points beyond the whiskers indicates a small number of outliers, but the overall distribution is well-behaved.

The boxplots for log_FA, log_gdp, log_PE_wins, and log_pop are all notably symmetrical. The median for each of these variables is centered within the interquartile range, and the whiskers are of similar length. This visual evidence confirms that the logarithmic transformations successfully normalized the highly skewed raw data, effectively mitigating the influence of outliers.

The boxplots for Colony and Oil illustrate the categorical nature and distribution of these variables. The Colony boxplot is a single box at the y=1 position, with a few outliers at y=0, which visually represents that a vast majority of the sample countries were former colonies. Conversely, the Oil boxplot is concentrated at y=0 with a long whisker and outliers at y=1, clearly showing that oil-producing countries are a small and rare group within the dataset.

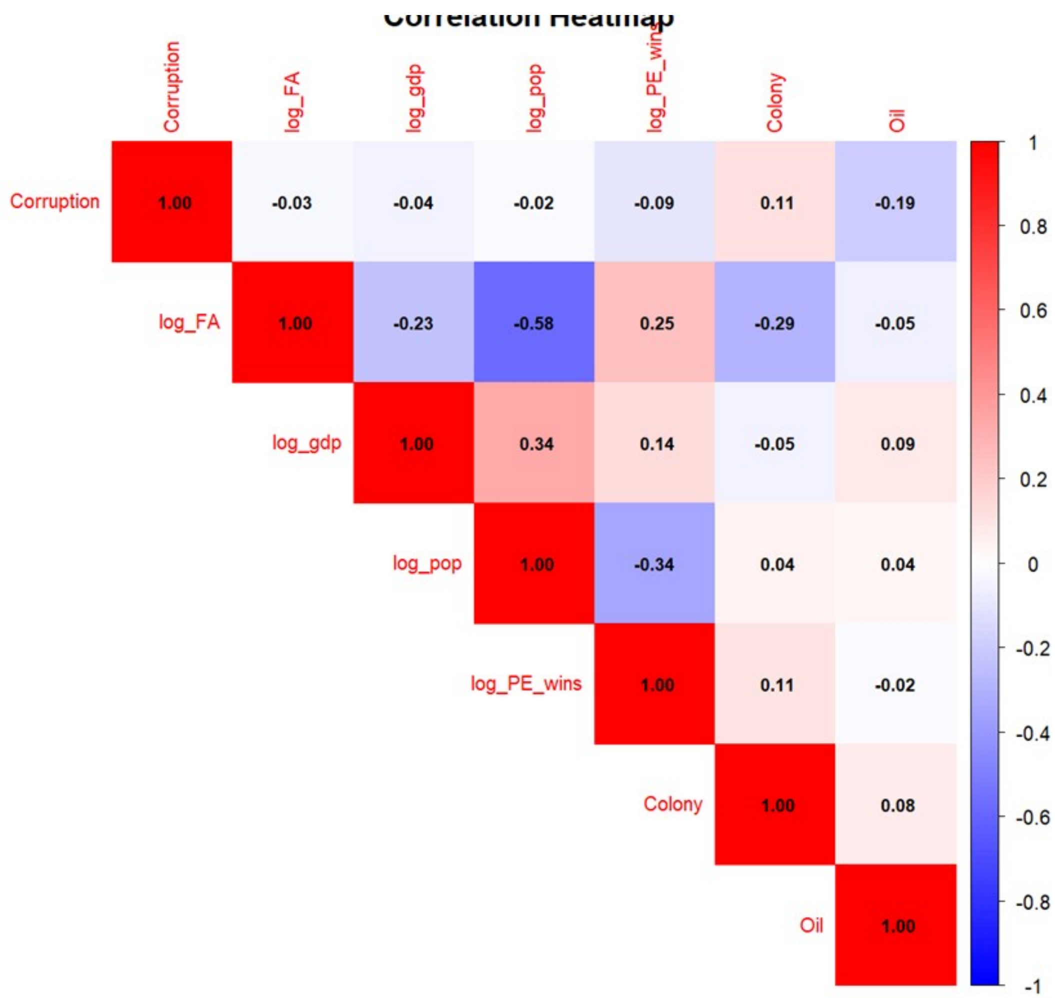


Correlation Heatmap:

The correlation heatmap provides the linear relationship between each pair of variables in the dataset. The color intensity and the value of each cell indicate the strength and direction of the correlation, ranging from -1 (perfect negative correlation) to 1 (perfect positive correlation).

The heatmap shows that Corruption, has very weak correlations with most of independent variables. The correlation coefficients for log_FA, log_gdp, log_pop, and log_PE_wins are all very close to zero, ranging from -0.09 to -0.02. The strongest correlations with Corruption are with the binary variables: a weak positive correlation with Colony (0.11) and a weak negative correlation with Oil (-0.19).

In conclusion, the correlations with Corruption are generally weak, and indicates a multiple regression model necessary. The correlations among independent variables are generally not high enough for severe multicollinearity, but the moderate correlation between log_FA and log_pop suggests that monitor for this issue in regression model by checking VIF scores.



VIF

The Variance Inflation Factor (VIF) is used to detect and measure the severity of multicollinearity. A VIF score quantifies how much the variance of an estimated regression coefficient is inflated due to linear relationships with other independent variables. A VIF of 1 indicates no correlation, and values greater than 1 suggest increasing levels of collinearity.

The VIF scores for all independent variables are well below the standard threshold of 5. Colony (1.19), Oil (1.02), log_gdp (1.27), and log_PE_wins (1.29) all have VIF scores very close to 1. This indicates that these variables are not highly correlated with the other predictors. The highest VIF scores are for log_FA (1.73) and log_pop (1.81). These values are very low and are no cause for concern. Hence, the VIF scores are excellent and there is no evidence of problematic multicollinearity.

Variable	VIF
Colony	1.19
Oil	1.02
log_FA	1.73
log_gdp	1.27
log_pop	1.81
log_PE_wins	1.29

• Interpretation of Regression Diagnostics

1. Breusch-Pagan Test for Heteroscedasticity

The table shows the results of two key tests that check for violations of the assumptions of Ordinary Least Squares (OLS) regression: the Breusch-Pagan test for heteroscedasticity and the Durbin-Watson test for autocorrelation. Since the p-value (0.0857) is greater than the conventional significance level of 0.05, fail to reject the null hypothesis. This is a good result, as it suggests there is no statistically significant evidence of heteroscedasticity in the model.

2. Durbin-Watson Test for Autocorrelation

The test statistic is 0.4204846, with a p-value of 0.0000. The Durbin-Watson statistic ranges from 0 to 4, where a value close to 2 indicates no autocorrelation, a value close to 0 indicates positive autocorrelation, and a value close to 4 indicates negative autocorrelation. Durbin-Watson statistic of 0.4204846 is very close to zero, and the p-value of 0.0000 is highly significant. This leads to reject the null hypothesis. The model shows strong positive autocorrelation.

The diagnostic tests indicate that model is free of heteroscedasticity, which is a positive outcome. However, the strong positive autocorrelation detected by the Durbin-Watson test is a serious issue that violates a key assumption of OLS regression. This suggests that the standard errors in the model may be biased, and t-statistics and p-values may be unreliable.

Heteroskedasticity and Autocorrelation Tests

Test	Statistic	df	p_value
Breusch-Pagan	11.0851754	6	0.0857
Durbin-Watson	0.4204846		0.0000

• Interpretation of the Hausman Test

The Hausman test is used in panel data analysis to choose between a Random Effects (RE) and a Fixed Effects (FE) model. Test has p-value of 0.017. Since the p-value (0.017) is less than the conventional significance level of 0.05, thus reject the null hypothesis. Therefore, the Fixed Effects model is the appropriate and consistent choice for this analysis. The FE model accounts for the correlation between your unobserved effects and the independent variables, producing reliable and unbiased estimates.

Hausman Test

Test	Statistic	df	p_value
Hausman	12.057	4	0.017

Regression Analysis

The results of three models examining the determinants of corruption are presented below. In the baseline OLS model, foreign aid (log_FA) is positively associated with corruption and significant at the 5% level, suggesting that higher aid correlates with higher corruption levels. Public expenditure (log_PE_wins) reduces corruption, while historical colonial ties (Colony) and oil resources (Oil) also show significant associations. However, the OLS model explains only 16% of the variation and is likely biased due to unobserved country-level factors and potential endogeneity.

The fixed effects (FE) model addresses unobserved heterogeneity by focusing on within-country variation over time. In this model, the positive effect of foreign aid persists and remains significant, while GDP (log_gdp) and population (log_pop) now show significant negative associations, indicating that richer countries experience lower corruption. Public expenditure continues to reduce corruption. Time-invariant variables such as Colony and Oil are not estimated in the FE model because they do not vary within countries over time. The FE model improves explanatory power ($R^2 = 0.361$) and provides more credible estimates than OLS.

The FE IV model further looks for potential endogeneity in foreign aid, offering a robust interpretation. The positive effect of foreign aid on corruption remains significant and slightly larger, while GDP, population, and public expenditure remained negative and significant. This model explains approximately 40% of the variation and reduces concerns about omitted variable bias or reverse causality. Nevertheless, the validity of the FE IV estimates depends critically on the chosen instruments being both relevant and exogenous; if these assumptions are violated, the results could still be biased. Overall, the evolution from OLS to FE and FE IV indicates that foreign aid appears to increase corruption, whereas higher economic development, larger population, and greater public expenditure consistently reduce it.

Panel Regression Analysis

Variable	OLS	FE(Robust)	FE IV(Robust)
log_FA	(0.469) 1.979*	(0.681) 2.09**	(0.728) 2.374**
log_gdp	(-0.513) -0.193	(-0.736) -2.597**	(-0.623) -2.385**
log_pop	(-0.064) -0.923	(-0.795) -1.992*	(-0.710) -1.952*
log_PE_wins	(-0.428) -2.081**	(-0.473) -2.558**	(-0.959) -2.712**
Colony	(0.194) 2.290*	-	-
Oil	-(0.506) -3.406***	-	-
R^2	0.1622	0.361	0.397
Num of Obs	261	261	261

p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

• Interpretation of the diagnostics for instrumental variables (IV) regression:

1. Durbin-Wu-Hausman Test for Endogeneity

This test evaluates whether the variable for instrumenting is indeed endogenous. The test statistic having p-value of 0.0382. Since the p-value is less than the conventional significance level of 0.05, reject the null hypothesis of exogeneity, providing statistically significant evidence that foreign aid is endogenous and that OLS estimates would be biased.

2. First-Stage Regression Diagnostics (Weak Instruments)

This test checks the relevance of instruments by assessing whether they are strong predictors of the endogenous variable. The test statistic is 4.429 with a p-value of 0.0046. The p-value is well below the 0.05 significance level, rejecting the null hypothesis, confirming that instruments are not weak and are strong predictors in the first stage of the regression.

3. Overidentification Test (Sargan/Hansen)

This test assesses the validity of instruments by checking if they are uncorrelated with the error term of the main regression. The test statistic is 26.6 with a p-value of 0.160. The p-value is greater than the conventional significance level of 0.05, failing to reject the null hypothesis, suggesting that instruments are valid and are not correlated with the error term.

Endogeneity Test (Durbin-Wu-Hausman)

Test	Statistic	p_value
Durbin-Wu-Hausman (Endogeneity)	3.126647	0.0382

First-Stage Regression Diagnostics

Test	statistic	p-value
Weak instruments	4.429614	0.004686508

Overidentification Test (Sargan/Hansen)

statistic	p-value
26.68416	0.1605489

4. Analysis

The results consistently show that higher foreign aid inflows are associated with higher levels of corruption. Several logical and theoretical mechanisms explain this outcome:

• Aid as Rents (Rent-Seeking Theory)

Aid inflows often resemble resource windfalls, similar to oil rents. Governments that receive large aid flows gain access to financial resources outside domestic taxation. This reduces the need to be accountable to people. Political elites may divert aid toward patronage networks, bribery, and reinforcing corruption.

• Weak Institutions (Institutional Trap)

In countries with weak governance systems, aid do not strengthen institutions but undermine them. Aid can incentivize the persistence of weak institutions because corrupt elites benefit from maintaining the systems that facilitate them. This creates an “institutional trap” where aid dependency and corruption reinforce each other.

• Moral Hazard and Soft Budget Constraint

Donors often continue providing aid even when misuse is evident, fearing humanitarian crises or geopolitical instability. This creates a “soft budget constraint” for recipient governments. Knowing that aid is unlikely to be cut off, governments face weaker incentives to control corruption.

• Counterpoint: Aid Can Still Work in Strong Institutions

The corruption-enhancing effect is not universal. Where institutions are strong and aid is conditional on reforms, it can reduce corruption by financing transparency, judicial reforms, and civil society oversight. This heterogeneity explains why aid may be beneficial in some contexts but harmful in weak states.

5. Conclusion

The findings of this study suggest that foreign aid, while intended to foster development, often increases corruption in recipient countries. This is because aid inflows frequently act as external rents, loosening the link between governments and their citizens. Unlike tax revenues, which require governments to be accountable, aid arrives without the same checks and balances, creating opportunities for rent-seeking and misuse of resources. In weak institutional infrastructure, these risks are amplified, allowing aid to reinforce rather than weaken corrupt practices.

This is aligned with theories in political economy and institutional development. Just as resource rents can contribute to the so-called "resource curse," aid can undermine incentives for reform when institutions are weak. Donors, motivated by humanitarian concerns, often continue providing support despite evidence of misuse.

However, it is not always that aid is corrupting. The evidence also shows that stronger economic development, greater public expenditure can mitigate corruption, suggesting that aid is rather institution-dependent. In countries with stronger governance frameworks and effective accountability, aid can still play a positive role.

In conclusion, foreign aid is neither a guaranteed driver of development nor an inevitable source of corruption. Its impact depends critically on the institutional environment in which it operates.