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Corruption and Education
An empirical study utilizing selected macroeconomic variables.

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Introduction

The Philippines has witnessed substantial transformations in its educational realm, with periods of austerity casting a shadow over the nation's dedication to fostering quality education. However, a more intricate aspect influencing educational outcomes in the Philippines is the intricate relationship between corruption and the educational sector.

Furthermore, corruption in the Philippines has played a significant role in distorting the government's financial allocations to the education sector, adversely affecting the quality and accessibility of education. Despite the nation's professed commitment to delivering high-quality education, the presence of corruption has exacerbated economic challenges, leading to the implementation of austerity measures that impede educational progress.

Corruption often manifested through embezzlement and bribery, diverts crucial funds away from the educational system, resulting in induced financial support for schools, insufficient infrastructure, and a dearth of resources for teachers. This has a cascading effect, limiting access to quality education and obstructing the nation's ability to provide an optimal learning environment for its students. The fight against corruption is thus intrinsically linked to enhancing the Philippine education system, emphasizing the need for transparent and accountable governance to ensure the effective utilization of resources for educational development.

But on the other hand, a different approach was experimented to talk about corruption and education. The research investigates the correlation between corruption levels and education in the Philippines, alongside selected macroeconomic indicators. Inspired by Maria and Group's "*The Effect of Education and Macroeconomic Variables on Corruption Index in G20 Member Countries*," specifically, the author's objectives include assessing the current state of corruption and education in the country, analyzing trends in key macroeconomic variables such as Gross Domestic Product (GDP) per capita, Economic Openness, Inflation Rates, Government Effectiveness Index, Education Level (mean years of schooling), Corruption Perception Index, and Philippine Debt-to-GDP ratio. The study seeks to determine the impact of the corruption perception index on these macroeconomic variables. Finally, the research intends to derive policy recommendations based on its findings.

Theoretical/Conceptual Framework

The Human Capital Theory

The Human Capital Theory, introduced by Gary Becker and Theodore Schultz in the 1960s, forms the foundation for understanding the relationship between education, training, and individual productivity. It posits that investing in education and skill-building enhances an individual's capabilities, leading to increased wages and improved job positions (Ross, 2021). In the context of corruption and education, the theory suggests that a well-educated and skilled workforce is vital for a nation's economic productivity.

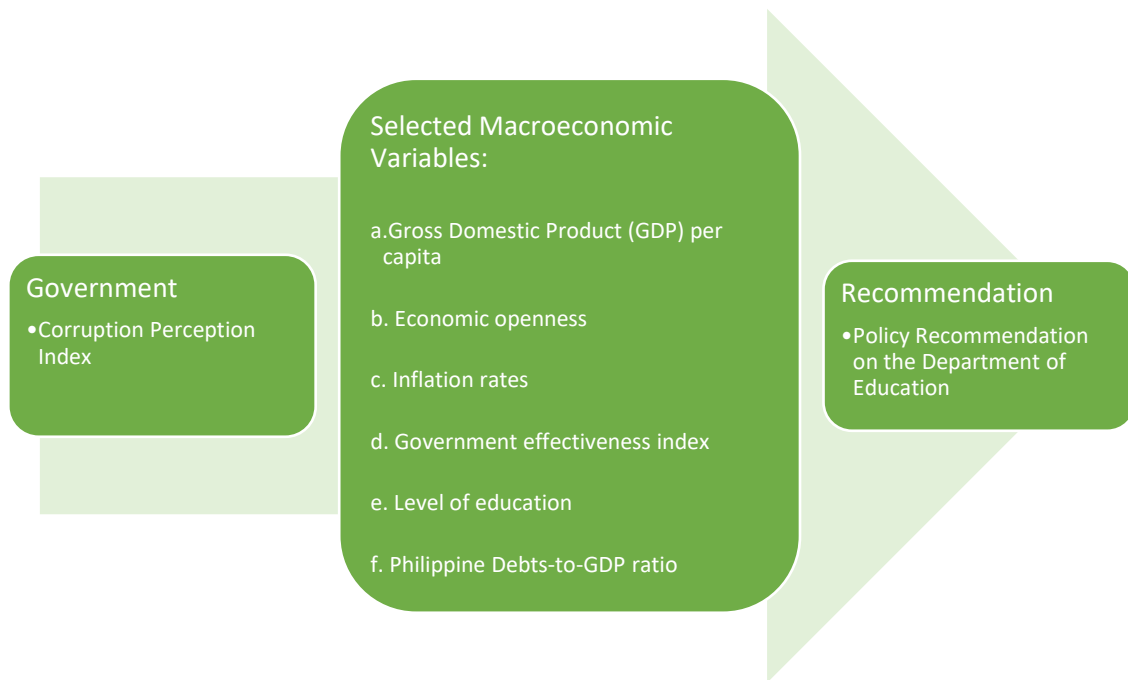


Figure 1. General Schematic Representation of the Research

Figure 1 shows the overall discussion of the research study. The researcher will first look for the availability of data regarding the corruption perception index, gross domestic product (GDP) per capita, economic openness, inflation rates, government effectiveness index, Philippine debt-to-GDP ratio, and level of education. The data gathering will be coming from various government agencies; from the Philippine Statistics Authority (PSA) to the Department of Budget and Management (DBM), the National Economic Development Authority (NEDA), the Philippine Institute for Development Studies (PIDS), and the Department of Finance (DOF) to create a trend analysis for an initial presentation. Then, the researcher will also seek the availability of data for the given factors affecting the corruption perception index, gross domestic product (GDP) per capita, economic openness, inflation rates, government effectiveness index, Philippine debt-to-GDP ratio, and level of education thru Philippine Statistics Authority (PSA), Department of Finance (DOF), Bangko Sentral nang Pilipinas (BSP), National Economic Development Authority (NEDA), Department of Trade and Industry (DTI), and Bureau of Customs (BOC). After this, the researcher will utilize all the collected data for further trend analysis and run using econometric measurement in Granger causality analysis. Lastly, through the results of the study and

investigations, the researcher will finally create a policy recommendation that might contribute to further sustaining the education system in the country.

Hypothesis:

It is important to present the research paper with one basic postulate, regarding the effect of the corruption index on the selected macroeconomic variables in the Philippines.

Ho: The corruption perception index has significantly affected the following macroeconomic variables; Gross Domestic Product (GDP) per capita, Economic openness, Inflation rates, Government effectiveness index, Philippine debt-to-GDP ratio, and Level of education.

Ha: The corruption perception index has not significantly affected the following macroeconomic variables; Gross Domestic Product (GDP) per capita, Economic openness, Inflation rates, Government effectiveness index, Philippine debt-to-GDP ratio, and Level of education.

Methodology

Research Approaches

This research utilizes descriptive research to examine the characteristics and trends of both dependent and independent variables. Descriptive research proves effective in recognizing and investigating trends. As the dependent variable (corruption perception index) and independent variables (Gross Domestic Product (GDP) per capita, Economic openness, Inflation rates, Government effectiveness index, Philippine debt-to-GDP ratio, and Level of education) have exhibited fluctuations over time, presenting them through summary statistics (mean and standard deviation) and visual aids (such as bar charts, line charts, and scatterplots) facilitates the highlighting of similarities and differences in their respective trends. In addition, a rapid regression analysis will be conducted to examine the relationship between the corruption perception index and the selected macroeconomic variables. Moreover, this study focused on the selected macroeconomic variables may yield more reliable results compared to the other studies. The study will utilize time-series data to further understand the relationship between the corruption perception index and all its selected macroeconomic variables.

Econometric Model

To further analyze and interpret the results of the data/information gathered, the researcher will utilize statistical treatments particularly Ordinary Least Squares (OLS) regression. Using the data obtained from different agencies here and abroad which are variables that are processed by agencies (local or international) to be tested through a multiple regression. Variables to be used for regression are treated according to their level of measurement, either ordinal or nominal. Basic statistical treatments such as mean and frequencies will also be used in the study. In presenting the results, the researcher will make use of software programs such as MS Excel, and Gretl. The researcher will employ the following research model:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + e$$

Regression Equation

ECONOMETRIC MODEL

$$\text{CPI} = \beta_0 + \beta_1 (\text{GDPpc}) + \beta_2 (\text{EO}) + \beta_3 (\text{IR}) + \beta_4 (\text{GEI}) + \beta_5 (\text{EL}) + \beta_6 (\text{PDTGR}) + e$$

where:

- Corruption Perception Index (CPI);
- Gross Domestic Product (GDPpc) per capita;
- Economic Openness (EO);
- Inflation Rates (IR);
- Government Effectiveness Index (GEI);
- Education Level (mean years of schooling) (EL);
- Philippine debt-to-GDP ratio (PDTGR).

Findings

This part of the study shows the results and interpretation of the researcher to validate the hypothesis and all the assumptions of the said study. The researcher briefly discusses the trend analysis of all the selected macroeconomic variables and utilizes econometric analysis through a multiple regression analysis.

Table 1: Trend analysis of selected macroeconomic variables for 23 years.

YEAR	CPI	GDPPC	INF	DBTGTB	EDUC	GEI	ECOX
2000	28	89604.19	3.977125	0.59	7.56718	-0.2	-7.8E+09
2001	29	90402.33	5.345502	0.59	7.836128	0	-8.6E+09
2002	26	91847.71	2.722772	0.65	8.105075	-0.18	-7.5E+09
2003	25	94591.38	2.289157	0.71	8.374023	-0.15	-7.8E+09
2004	26	98821.95	4.829211	0.72	8.64297	-0.22	-7.5E+09
2005	25	101718	6.516854	0.66	8.6599	-0.02	-1E+10
2006	25	105126.4	5.485232	0.59	8.67683	-0.13	-7E+09
2007	25	109905	2.9	0.52	8.69376	0.11	-8E+09
2008	23	112554.7	8.260447	0.52	8.71069	0.05	-1.7E+10
2009	24	112103	4.219031	0.52	8.81284	0.03	-9E+09
2010	24	118176.8	3.789836	0.5	8.91499	0.07	-1.1E+10
2011	26	120568.9	4.718417	0.49	8.991987	0.19	-1.4E+10
2012	34	126656.9	3.026964	0.49	9.068983	0.21	-1.3E+10
2013	36	132945.1	2.582688	0.47	9.14598	0.21	-1.1E+10
2014	38	139116.9	3.597823	0.43	8.97111	0.32	-1.3E+10
2015	35	145498.5	0.674193	0.43	8.79624	0.16	-1.8E+10
2016	35	153159.8	1.253699	0.4	8.62137	0.02	-2.9E+10
2017	34	160916.4	2.853188	0.4	8.4465	-0.04	-3.2E+10
2018	36	168236	5.309347	0.4	8.7078	0.06	-3.9E+10
2019	34	175598.9	2.392065	0.4	8.9691	0.06	-3.6E+10
2020	34	156321.3	2.393162	0.55	8.97141	0.07	-2E+10
2021	33	162803.2	3.92718	0.6	8.97141	0.04	-3.9E+10
2022	33	172584	5.821158	0.61	8.97141	0.06	-5.4E+10

Source: World Bank, Department of Finance (SOF), National Economic Development Authority (NEDA), Philippine Statistics Office (PSA), and World Trade Organization (WTO).

Table 1 shows the movement of the selected macroeconomic variables for 23 years, starting from the year 2000 to 2022. This trend analysis comprises the following selected macroeconomic variables: Corruption Perception Index (CPI), Gross Domestic Product (per capita); Inflation rate; Debt to Gross Domestic Product ratio (in decimal); Education (number of years of schooling), and Government Effectiveness Index.

Figure 1: Corruption Perception Index of the Philippines from 2000 to 2022.

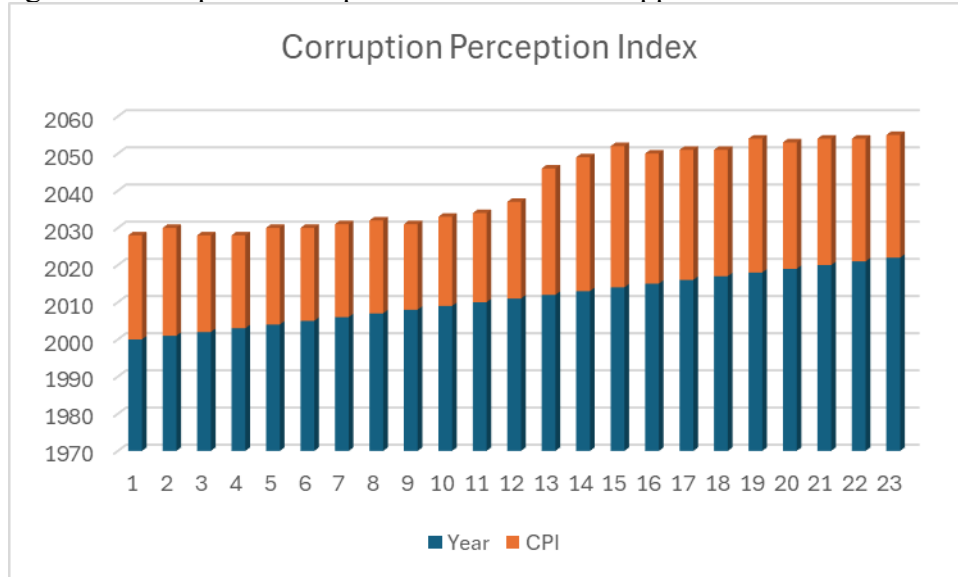
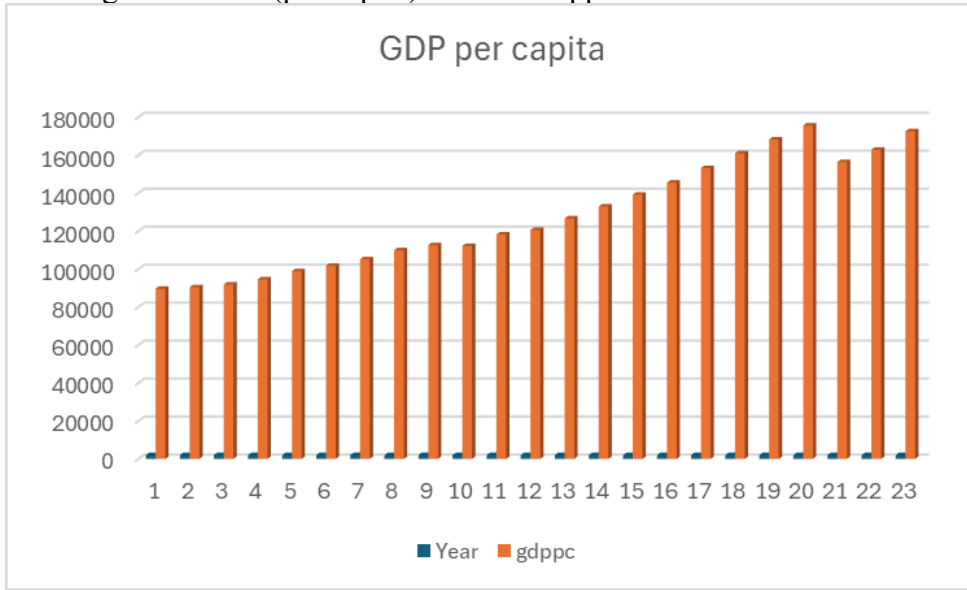


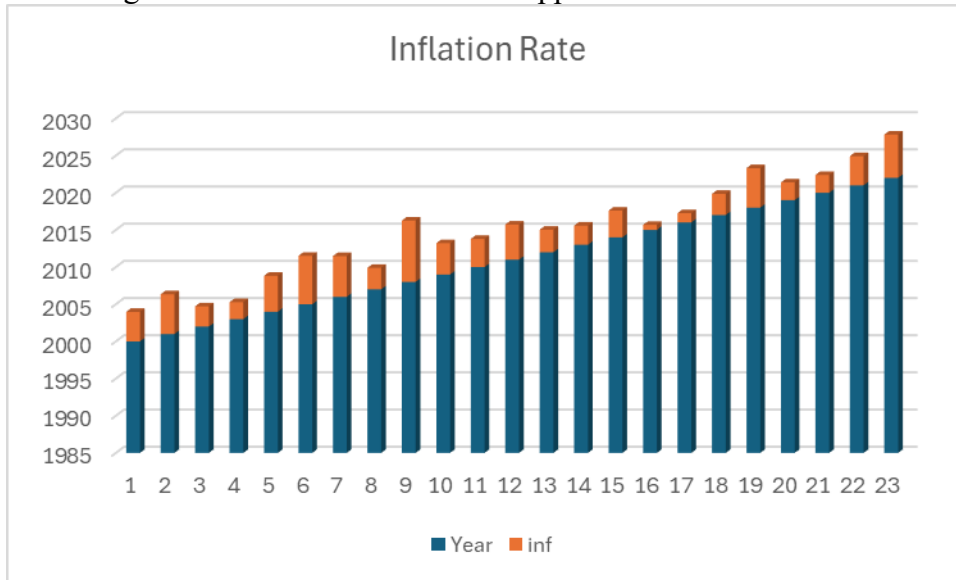
Figure 1 shows the increasing status of the corruption perception index of the Philippines from 2000 to 2022. CPI was determined by the expert evaluators, opinion surveys, and discussions on their perception when it comes to the level of public sector corruption. Based on the trend analysis, the country recorded a significant increase over the past two decades. Ranking from 23 (lowest) in 2008 in the world to 38 (highest) in the year 2014. The latest, 2023, shows an increase in a piece of knowledge as the country scored 34 out of 100 from 33 in 2022, but still below the global standard of 43. As the country tries to focus on achieving significant economic growth, it still suffers drastically due to all the problems of graft and corruption. According to inquirer.net, there are four possible syndromes why it exists; first, “influence market corruption” where public officials act as a “middleman” as they connect one person to another. The second syndrome is “elite cartel corruption”, for personal gain, the existence of the elite network’s possible collusion in guarding their economic and political advantage. The third syndrome is “official mogul corruption” wherein the top business moguls are also elected officials and suffer few barriers from the state or their competition. And lastly, “oligarch-and-clan corruption” wherein the wealth and power of the nation were just moving within their exclusive circles.

Figure 2: GDP (per capita) of the Philippines from 2000 to 2022.



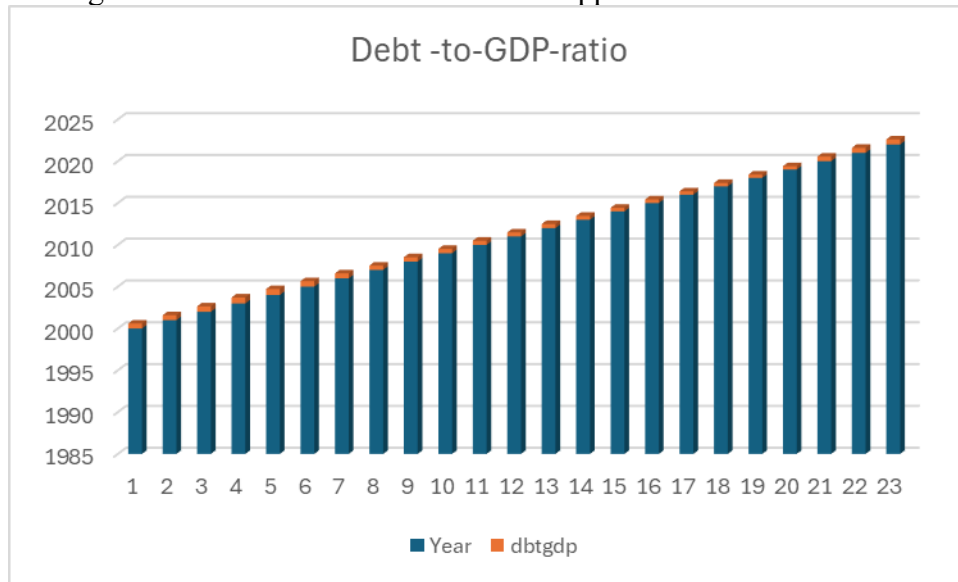
This figure shows a weak improvement in the country's gross domestic product per capita from the lowest of 89,604.19 in the year 2000 to 175, 598.9 in the year 2019. Due to covid-19 pandemic, a substantial decrease was witnessed in the years 2020 and 2021 with a GDP per capita of 156,321.3 (2020) and 162, 803.2 (2021) respectively.

Figure 3: Inflation rate of the Philippines from 2000 to 2022.



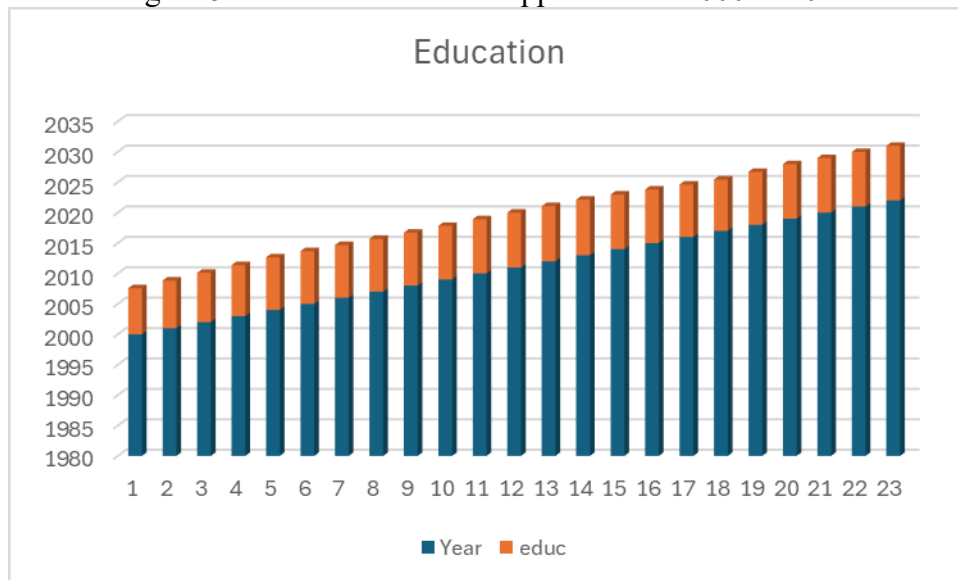
This figure shows the fluctuating results of the inflation rate in the country for the past 23 years as Bangko Sentral nang Pilipinas or BSP did an amazing job securing and monitoring the inflation movement of the country. From the highest of almost 8.3% in 2008 and the lowest of 0.67% in 2015. BSP is the lone government agency that is noteworthy due to its dedication to providing transparency to the nation, especially in the time of pandemic.

Figure 4: Debt-to-GDP-ratio of the Philippines from 2000 to 2022.



The country’s significant increase in debt-to-GDP-ratio is due to the government’s ballooning budget deficit. According to Viray, E. and Bato, J., “to stop and lessen the impact of the ongoing health crisis, the nation began to accumulate debt. As of May 2022, the National Government's (NG) total debt was a startling P12.7 trillion, made up of P3.81 trillion in external debt and P8.87 trillion in domestic debt (Bureau of Treasury). About 70% of the obligation came from domestic sources, with the remaining 30% coming from borrowing from outside sources. When borrowing turned out to be the most effective way for the nation to replenish its war chest for pandemic recovery, the debt load began to soar.

Figure 5: Education in the Philippines from 2000 to 2022.



This one (Figure 5) shows the increasing rate of education variable as it is perceived as several years of schooling. This indicator has achieved several successes and praises here and abroad as the country's campaign in the education sector proved to be effective, reliable and efficient.

Figure 6: Government effectiveness index in the Philippines from 2000 to 2022.

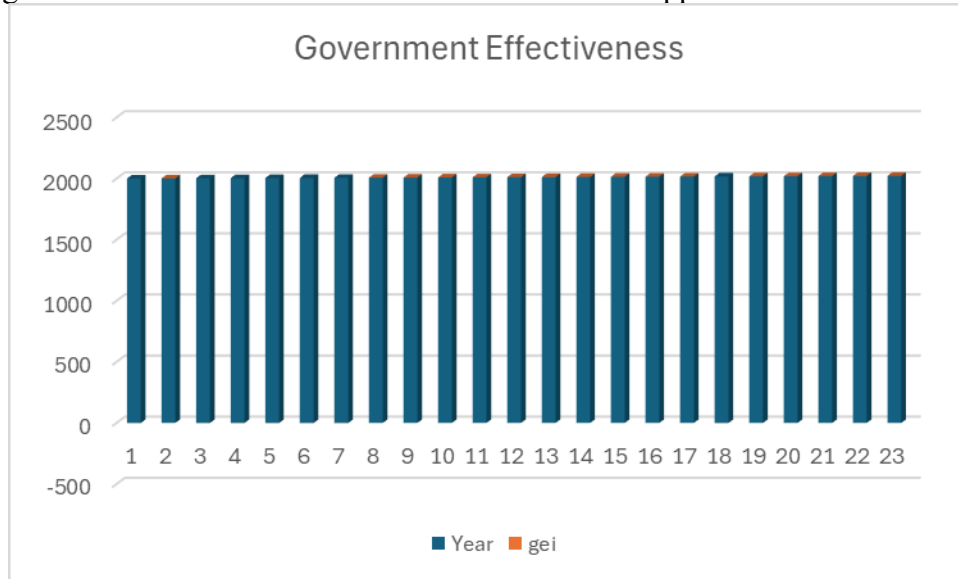


Figure 6 on the other hand, the concept of government effectiveness is due to the perceptions of the quality of public services in the Philippines; the quality of civil service and its degree of autonomy from political pressures, the distinctive making of policy and execution; and the legitimacy of the government's commitment to these policies. The data of the country on government effectiveness has a steady status, as it hasn't improve for the past two decades, as it scored -0.22 (lowest) in 2004 and highest 0.32 in 2014 under the Noynoy Aquino Administration.

Figure 7: Economic Openness (Net Trade) in the Philippines from 2000 to 2022.

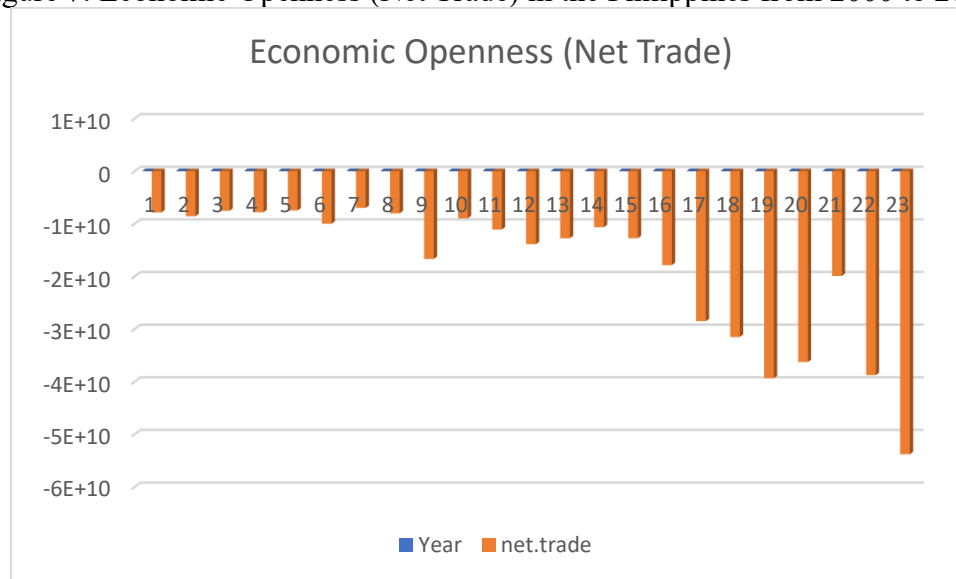


Figure 7 shows a continuous decline in Philippine Net Trade – the main indicator of economic openness. The Philippines’ importation continues to dominate the exporting capabilities of the country. due to low-income levels, local production must be expensive or budget-wise, imported products are much cheaper that it’s the last resort of the modern Filipino family,

Econometric Model Presentation

Model Fit Measures

Model	R	R ²	Adjusted R ²
1	0.904	0.817	0.748

The regression model determines the reliability and robustness of the statistical analysis. After running the pooled OLS, the results seemingly show a good indicator. So far R squared is a goodness of fit measure for linear regression, that’s why for this model, the R is 0.904 equivalent to 90%; while the R squared is 0.817 or almost 82%; lastly, the adjusted R squared has 0.748 or close to a 75% level of significance, which implies that the model can be explained around 75% of the variation in CPI.

On the other hand, for the p-value, GDP per capita, education level, and government effectiveness index are statistically fit as all the values lower than the 0.05 level of significance as compared to the other variables higher than 0.05.

Model Coefficients - cpi

Predictor	Estimate	SE	t	p
Intercept	63.399	16.564	3.827	0.001
gdppc	3.20e-4	9.62e-5	3.325	0.004
inf	-0.210	0.427	-0.491	0.630
dbtgdpc	20.164	10.541	1.913	0.074
educ	-9.153	2.722	-3.363	0.004
gei	19.210	6.826	2.814	0.012
net.trade	2.99e-10	1.58e-10	1.898	0.076

The model coefficients show that as CPI increases, selected macroeconomic variables like GDP per capita with 3.20e-4, debt-to-GDP-ratio with a value of 20.164, government effectiveness index with 19.210, and economic openness (net trade) of 2.99e-10 has proportionately connected as it registers positive sign which significantly validates that as corruption perception index increases, they will tend to increase as well. While the inflation rate of -0.210 and education level of -9.153 is inversely related to the corruption perception index.

Assumption Checks

Durbin–Watson Test for Autocorrelation

Autocorrelation	DW Statistic	p
0.254	1.49	0.030

The Durbin-Watson statistic is a test for autocorrelation in the regression model's output. The DW statistics of 1.49 on this model show a positive autocorrelation of CPI to all its selected macroeconomic indicators.

Normality Test (Shapiro-Wilk)

Statistic	p
0.974	0.778

As for the Shapiro-Wilk test, a result greater than 0.05 shows the normality of data and so far, it shows .974 (stat) and 0.778 (p) and does not significantly deviate from a normal distribution.

Collinearity Statistics

	VIF	Tolerance
gdppc	27.46	0.0364
inf	2.01	0.4977
dbtgdp	3.90	0.2562
educ	4.08	0.2453
gei	3.23	0.3094
net.trade	15.50	0.0645

This result indicates that multicollinearity exists in the following variables GDP per capita (0.0365), debt-to-GDP ratio (0.2562), education level (0.2453), and economic openness – net trade (0.0645), that is,, why further investigation is required. While the inflation rate (0.4977) and government effectiveness index (0.3094) have significant multicollinearity that needs to be fixed or corrected.

Conclusion

Given the risks of this study, the researcher continuous to gain more strength in starting this kind of observation involving several macroeconomic indicators.

- Results of the study show positive signs of hope for this approach to continue investigated by future reporters.
- R squared and adjusted R squared show goodness-fit-measure for the given linear regression.
- Almost sixty percent (60%) of determinants or independent variables from GDP per capita, debt-to-GDP ratio, government effectiveness index, and even economic openness (net trade) show proportionally related with the corruption perception index.
- As inflation rate and education show an inversely proportional relationship to the corruption perception index.
- Overall, all selected macroeconomic variables played a significant impact in the study, as it shows their dominance and resistance, further study must be conducted to further understand corruption through education.

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