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Table of Contents

1. Overview and data collection

Net official development aid (ODA) received (% of GNI) is critical since it is the key source of money from foreign governments that is required for growth, welfare, and poverty reduction (low- and middle-income countries) (Matters, D, 2023). Since 2005, the only requirement for inclusion on the "DAC list of ODA eligible countries" has been the nation's position as a low or middle-income country as defined by the World Bank's income (GNI per capita). As a result, the two selected countries, the Philippines (PHL) and Argentina (ARG), met the criterion. However, there is an exception to the rule: nations who are EU members or prospective EU members with a specific date of arrival.

According to (Anon,2023), the allocation of foreign aid is a complex process with several elements that all contribute to the amount a nation will get. Nonetheless, it may be summarized into three major factors: economic indicators, political influence, and the humanitarian

catastrophe.

A. Economic Indicators GDP per capita and GNI are essential factors in determining which countries get and how much they receive since they are the major economic parameters that impact foreign assistance allocation. To explain, low-income nations with high rates of poverty tend to obtain more help from other countries to promote social and economic development (Oleksandra,2023).

B. Political influence: International aid distribution was highly influenced by political factors. This raises the negative side of Net ODA received (% of GNI), as donor nations might impose constraints on recipient countries to further improve their standing.

C. Humanitarian crisis refers to natural disasters, continuing wars, and civil disputes.

2. Descriptive statistics:

Table 2.1: Descriptive statistics of Central of Tendency for PHL and ARG

	Mean	Mode	Median	Standard deviation	Range	IQR	Variance
Philippines (PHL)	**0.417499**	**#N/A**	**0.378412**	**0.343961**	**1.397285**	**0.497053**	**0.118309**
Argentina (ARG)	**0.035656**	**#N/A**	**0.032226**	**0.02771**	**0.109945**	**0.038821125**	**0.000768**

Table 2.2: Outlier check for PHL and ARG data

	Min	>,<,=	Lower bound	Max	>,<,=	Upper bound	Result
Philippines (PHL)	**-0.05236**	**<**	**-0.043764021**	**1.344926**	**<**	**1.385254**	**There is 1 outlier**
Argentina (ARG)	**-0.00323**	**>**	**-0.60296**	**0.106712**	**<**	**0.11152048**	**There is no outlier**

2.1 The measure of central tendency:

Mean is the best measure of central tendency for computing the average value of datasets based on Table 2.1. However, the dataset contains outliers (Table 2.2) and there is no mode which makes median the best measure of central tendency. Comparing the two countries, PHL is ten time higher than ARG implying that PHL receive higher net ODA (% of GNI)

2.2 Measure of variation:

IQR is the most accurate measure of variance since it is unaffected by outliers. PHL has a greater IQR (0.49>0.03) than ARG. The IQR illustrates the distribution of the middle 50% of observations. Higher IQR results in less consistent middle 50% observations, and vice versa.

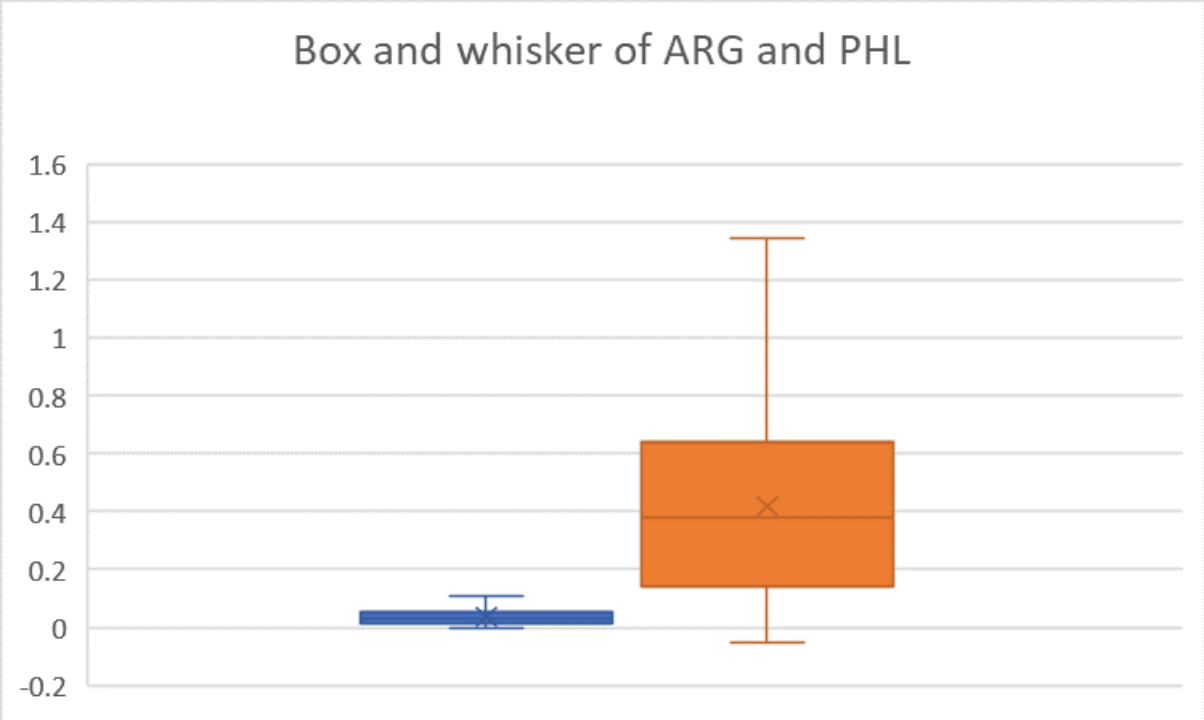
Table 2.3: Descriptive Statistics of Variation for Argentina Net ODA Received (% of GNI)

Standard Deviation	0.027709905
Sample Variance	0.000767839
Kurtosis	0.682663887
Skewness	0.823251984
Range	0.109945189
IQR	0.035379885

2.3 Box and whisker plot:

Argentina(ARG)	**Left side**	**>,<,=**	**Right side**	**Conclusion**	**Skewness**
Q1-min vs Max – Q3	**0.017700961**	>	**-0.054**	**Right skew**	**Right skew**
Q2-Q1 vs Q3-Q2	**0.017758**	<	**0.021063125**	**Left skew**	
Mean vs median	**0.035656**	>	**0.032226**	**Right skew**	

Philippines(PHL)	**Left side**	**>,<,=**	**Right side**	**Conclusion**	**Skewness**
Q1-min vs Max – Q3	**0.194979**	<	**0.705252**	**Left skew**	**Right skew**
Q2-Q1 vs Q3-Q2	**0.235792**	<	**0.261261**	**Left skew**	
Mean vs median	**0.417499**	>	**0.378412**	**Right Skew**	



According to the two figures above, the whisker and plot of both nations are right skew, since the mean of both PHL and ARG is greater than the median. The graph also displays the PHL outliers that have a considerable impact on sensitive measures like range and mean. These two measures are not recommended since the outcome may differ. Furthermore, the box plot shows that ARG's median is somewhat lower than PHL's, and PHL's graph is longer than ARG's. This shows that PHL has received more Net ODA than ARG

3. Multiple Regression

Country A: Philippines

After building regression models and using elimination backward procedures at a 5% significance level (Figure 3.1), three variables were used: renewable energy consumption, exported products and services (% of GDP), and urban population growth (%).

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.947044266
R Square	0.896892842
Adjusted R Square	0.858905995
Standard Error	0.129200343
Observations	27

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	2.758879137	0.39412551	23.61061525	4.21135E-08
Residual	19	0.317161842	0.016692729		
Total	26	3.076040979			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 90.0%*	*Upper 90.0%*	*Lower 99.0%*	*Upper 99.0%*
Intercept	-4.053837245	1.393768119	-2.908544821	0.009007902	-6.971027597	-1.136646903	-6.463847558	-1.643826942	-8.041316897	-0.066357603

Renewable energy consumption (% of total final energy consumption)	0.063257416	0.030604369	2.06694069	0.052640565	-0.000798265	0.127313097	-0.010338397	0.116176435	-0.024299683	0.150814515
Exports of goods and services (% of GDP)	0.012370835	0.007639868	1.619247202	0.121873899	-0.003619593	0.028361263	-0.000839512	0.025581182	-0.009486328	0.034227998
Urban population growth (annual %)	-0.282219832	0.247718134	-1.139278051	0.268747576	-0.800699845	0.236260108	-0.710557385	0.146117712	-0.990925213	0.426485548

Figure 3.1 – The Regression Model of Philippines

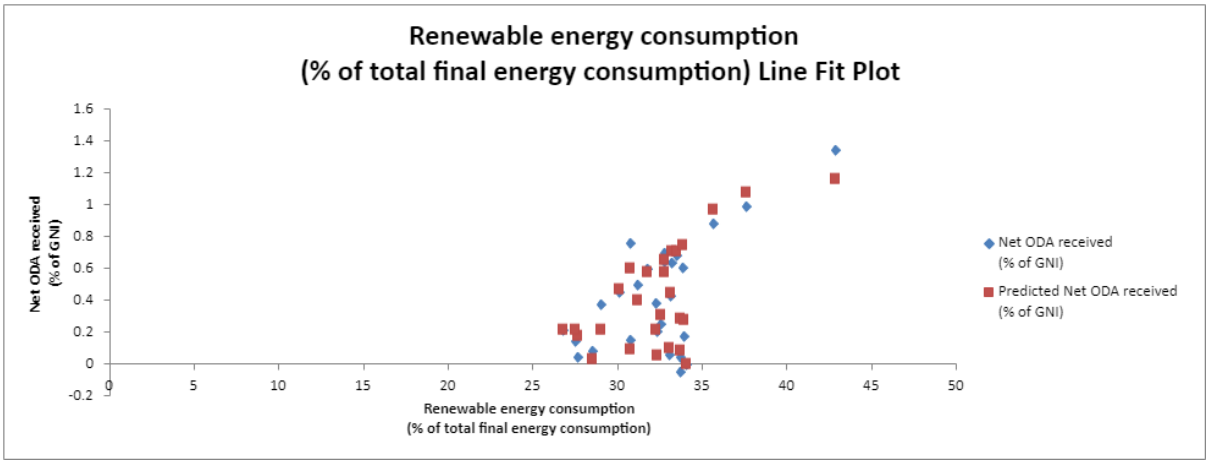


Figure 3.2 - The Line Fit Plot of Renewable energy consumption (% of total final energy consumption)

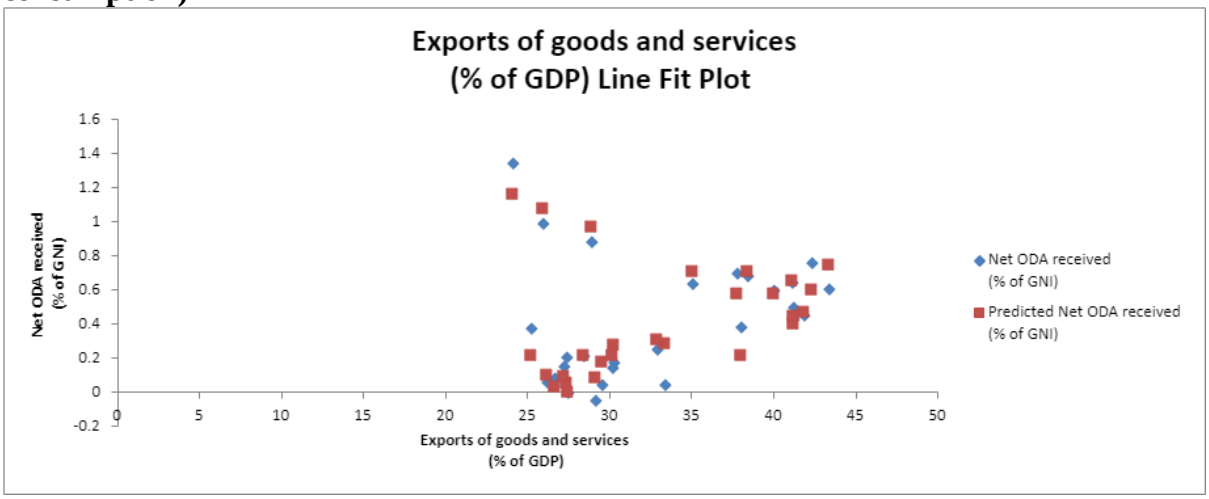


Figure 3.3 - The Line Fit Plot of Exports of goods and services (% of GDP)

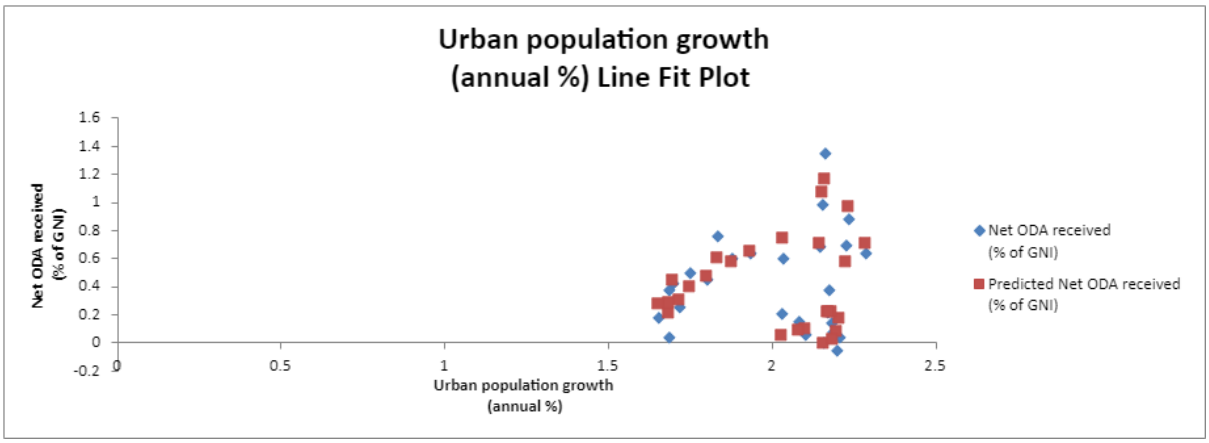


Figure 3.4 – The Line Fit Plots of Urban population growth (annual %)

Based on the Figures 3.2, 3.3, and 3.4 above, the Net ODA received (% of GNI) has a negative relationship with all three variables, comprising Exports of goods and services (% of GDP), Urban population growth (annual %), and renewable energy consumption (%).

Regression Equation

$\hat{y} = b0 + b1X1 + b2X2 + b3X3$

Net ODA received = -4.0538 +0.0632(Renewable Energy Consumption) +0.0123 (Export of Goods and Services) - 0.2822 (Urban Population Growth)

b0=-4.0358 shows that the Net ODA received (% of GNI) is 4.0358 without Exports of goods and services (% of GDP), Urban population growth (annual %), and renewable energy consumption (%) (X1, X2 and X3 =0)

b1= 0.0632 demonstrates that the Net ODA received (% of GNI) reduces by 0.0632 for every percentage point rise in total energy consumption in Renewable Energy consumption, while keeping exports of goods and services and urban population growth unchanged.
b2 = 0.0123 indicates that the Net ODA received (% of GNI) grows by 0.0123 for every percentage point growth in GDP from exports of goods and services, while keeping Renewable Energy Consumption and Urban Population Growth unchanged.
b3= - 0.2822 demonstrates that for every percentage rise in urban population growth, the Net ODA received (% of GNI) declines by -0.2822, while Renewable Energy Consumption and Export of Goods and Services remain unchanged.

Interpret the Coefficient of determination

The coefficient of determination for the Philippines is 0.94 (R Square = 94%), meaning that three variations—renewable energy consumption (% of total), exports of goods and services (% of GDP), and annual urban population growth (%)—account for 94% of the variation in net ODA received (% of GNI). The remaining 6% is attributable to other factors.

Country B: Argentina

In addition, only one variable exists after building in the regression model and applying the elimination backward method (Figure 7) which is the renewable consumption energy (% of total) over the other 6 variables at 5% of significant level.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.964435376
R Square	0.930135595
Adjusted R Square	0.904396077
Standard Error	0.008567871
Observations	27

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	7	0.018569005	0.002652721	36.13648097	1.13239E-09
Residual	19	0.001394776	7.34084E-05		
Total	26	0.019963781			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 90.0%*	*Upper 90.0%*	*Lower 99.0%*	*Upper 99.0%*
Intercept	-0.049788372	0.068878066	-0.722847998	0.478577659	-0.193951822	0.094375077	-0.168887697	0.069310952	-0.246844016	0.147267271

Renewable energy consumption (% of total final energy consumption)	0.002025593	0.002402616	0.843077972	0.409673328	-0.003003141	0.007054326	-0.002128805	0.006180035	-0.004848135	0.008899321

Figure 3.5 – The Regression Model of Region B

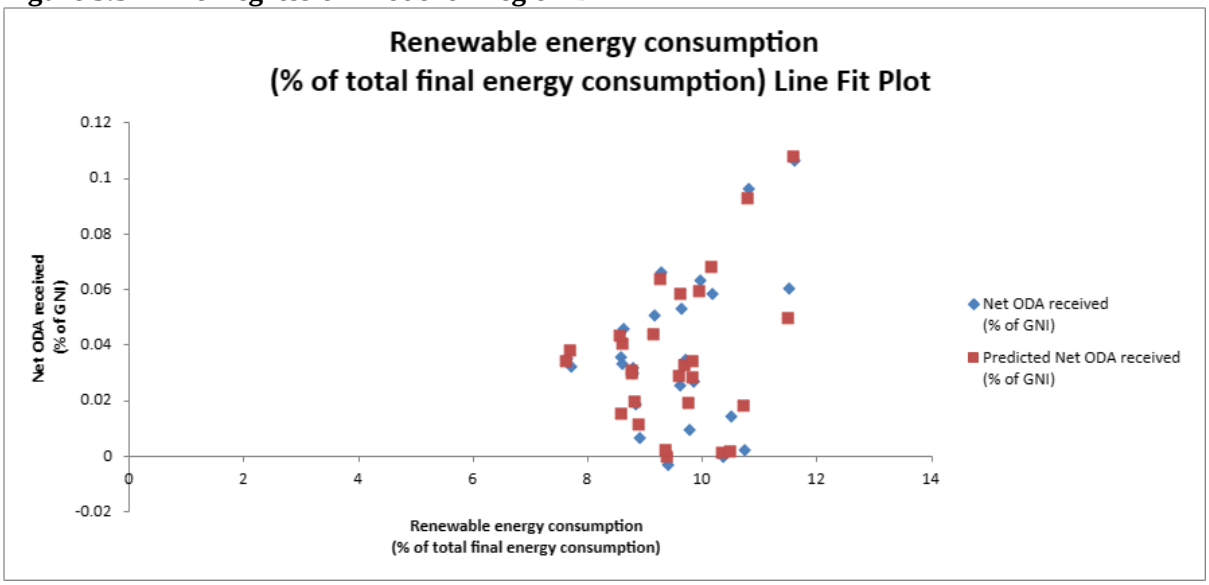


Figure 3.6 — The Line Fit Plot of Renewable energy consumption (% of total final energy consumption)

The Figure 3.6 above demonstrates that both Net ODA received and Predicted Net ODA received are increasing, indicating a positive link.

Regression Equation:

$\hat{y} = b0 + b1X1$

Net ODA received = -0.0497 + 0.002 (renewable energy consumption).

The regression coefficient (b0 = -0.0497) indicates that the Net ODA received (% of GNI) is negative when Renewable consumption energy (X1 = 0) is excluded.

b1 = 0.002 indicates that the Net Oda received rises by 0.002 for each percentage of total final energy consumption in renewable energy consumption.

Interpret the coefficient of determination

As a result, just one variable—the percentage of total final energy consumption attributed to renewable energy—can account for 96% of the overall variance in Net ODA received (as a percentage of GNI), according to Argentina's coefficient of determination of 0.96 (R Square = 96%). The remaining variation variables (4%) are the other variation factors that affect the Net ODA received.

4. Team Regression Conclusion

Based on the regressions of each data set in the Philippines and Argentina, it can be concluded that the regressions are very different. After observation, both datasets have the same independent variables. For the Philippines, CO2 emissions (metric tons per capita) uniquely account for a higher proportion of variation, compared to the others. Moreover, it can be seen that Exports of goods and services (% of GDP) gain more influence on the Net ODA received (% of GNI).

5. Time Series Analysis

ARGENTINA

The decline in Argentina's Net ODA received (% of GNI) line chart can reveal some important things about the country's development assistance situation. ODA (Official Development Assistance) is assistance given to poor nations to help them promote economic and social development. Argentina's partnerships with nations or international organizations giving ODA may have shifted. International partners' help may be reduced owing to political, economic, or geographical reasons. The Argentine government's approach for obtaining and implementing ODA may have altered.

PHILIPPINES

A declining line graph represents the Philippines' Net ODA received as a percentage of GNI. A significant source of money for many developing nations is net ODA (Official Development Assistance), which goes toward paying essential development initiatives including infrastructure, healthcare, education, and economic growth.
The decline in Net Official Development Assistance (ODA) for the Philippines might have numerous explanations. One possibility is that donor nations have reallocated their funds to other areas or nations.

2. ARGENTINA

One-Sample Kolmogorov-Smirnov Test		
		Argentina
N		**27[c]**
Exponential parameter.[a,b]	**Mean**	**.038644873860369**
Most Extreme Differences	**Absolute**	**.241**
	Positive	**.099**
	Negative	**-.241**
Kolmogorov-Smirnov Z		**1.207**
Asymp. Sig. (2-tailed)		**.109**
a. Test Distribution is Exponential.		
b. Calculated from data.		
c. There are 2 values outside the specified distribution range. These values are skipped.		

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.050	.069		-.723	.479
	Renewable energy consumption (% of total final energy consumption)	.002	.002	.072	.843	.410
	Exports of goods and services (% of GDP)	.003	.001	.685	5.033	.000
	Urban population growth (annual %)	.000	.011	.002	.029	.977
	Debt service (PPG and IMF only, % of exports of goods, services and primary income)	.000	.000	-.087	-1.042	.311
	Military expenditure (% of GDP)	.089	.017	.714	5.216	.000
	Tax revenue (% of GDP)	.003	.003	.198	1.182	.252
	CO2 emissions (metric tons per capita)	-.027	.012	-.365	-2.148	.045
a. Dependent Variable: Net ODA received (% of GNI)						

Y: Net ODA received (% of GNI)
X1: Renewable energy consumption (% of total final energy consumption)
X2: Exports of goods and services (% of GDP)
X3: Urban population growth (annual %)
X4: Debt service (PPG and IMF only, % of exports of goods, services and primary income)
X5: Military expenditure (% of GDP)
X6: Tax revenue (% of GDP)
X7: CO2 emissions (metric tons per capita)
Model: Y= -.050 + 0.003X2 + 0.089X5

PHILIPPINES

One-Sample Kolmogorov-Smirnov Test		
		Philippines
N		27[c]
Exponential parameter.[a,b]	Mean	.453039435145275
Most Extreme Differences	Absolute	.162
	Positive	.073
	Negative	-.162
Kolmogorov-Smirnov Z		.811
Asymp. Sig. (2-tailed)		.526
a. Test Distribution is Exponential.		
b. Calculated from data.		
c. There are 2 values outside the specified distribution range. These values are skipped.		

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-4.054	1.394		-2.909	.009
	Renewable energy consumption (% of total final energy consumption)	.063	.031	.602	2.067	.053
	Exports of goods and services (% of GDP)	.012	.008	.229	1.619	.122
	Urban population growth (annual %)	-.282	.248	-.173	-1.139	.269
	Debt service	.022	.012	.335	1.911	.071

	(PPG and IMF only, % of exports of goods, services and primary income)					
	Military expenditure (% of GDP)	**.591**	**.176**	**.631**	**3.352**	**.003**
	Tax revenue (% of GDP)	**.000**	**.061**	**-.001**	**-.004**	**.997**
	CO2 emissions (metric tons per capita)	**1.539**	**.702**	**.692**	**2.193**	**.041**
a. Dependent Variable: Net ODA received (% of GNI)						

Y: Net ODA received (% of GNI)
X1: Renewable energy consumption (% of total final energy consumption)
X2: Exports of goods and services (% of GDP)
X3: Urban population growth (annual %)
X4: Debt service (PPG and IMF only, % of exports of goods, services and primary income)
X5: Military expenditure (% of GDP)
X6: Tax revenue (% of GDP)
X7: CO2 emissions (metric tons per capita)
Model: Y= -4.054+ 0.591X5 + 1.539X7
Provide the formula
x and one dependent variable y can be expressed as:
$y=\beta 0 + \beta 1x+\varepsilon$
In this equation:
y is the dependent variable (the variable we are trying to predict).
x is the significant independent variable (the variable that significantly influences y)
$\beta 0$ is the y-intercept, representing the value of y when x is zero.
$\beta 1$ is the coefficient of the significant independent variable (less than 0.05), representing the change in y for a one-unit change in x.
ε is the error term, representing the difference between the observed and predicted values of
The magnitude of B1 indicates the degree of change in y for a one-unit change in 2. If B1=0.003 of Argentina, it means that for every one-unit increase in x, y is expected to increase by 0.003 units. Similarly, if B1=-0.003, it means that for every one-unit increase in x, y is expected to decrease by -0.003 units. This indicates the strength and direction of the relationship between the significant independent variable and the dependent variable y.
Similarly, if B1= -0.003, it means that for every one-unit increase in x, y is expected to decrease by -0.003 units. If B1=0.591 of Philippines, it means that for every one-unit increase in x, y is expected to increase by 0.591units. Similarly, if B1= -0.591, it means that for every one-unit increase in x, y is expected to decrease by -0.591 units.

5.4. Which trend model will you recommend predicting Net ODA received (% of GNI) of Argentina and the Philippines.

Proposed expected net ODA received (% of GNI) for Argentina:
Linear recovery model: This model assumes a linear relationship between economic variables (e.g. GDP growth, unemployment rate) and ODA received (% GNI).
Proposed expected net ODA received (% of GNI) for the Philippines:
Linear recovery model: This model assumes a linear relationship between economic variables (e.g. GDP growth, unemployment rate) and ODA received (% GNI).
Reasons for proposing the Linear Regression model To predict the net ODA received (% GNI) of Argentina and the Philippines:
Given its success in assessing the link between independent and dependent variables, the linear regression model might be used to forecast net ODA received (% GNI). Assuming a linear relationship in this case, the two countries' economic, social, and political qualities, as well as the amount of ODA (% of GNI) received, are connected. The linear regression model is a simple and clear approach. This means that the model's output may be understood and interpreted clearly.

5.5. Predict the Net ODA received (% of GNI) of Argentina and the Philippines for the years 2024, 2025, 2026, 2027, and 2028.

In addition, based on current trends and estimates, here are some predictions about Argentina's likelihood of receiving ODA (% GNI) in the coming years:
2024: 0.20% - 0.25% GNI
2025: 0.22% - 0.27% GNI
2026: 0.25% - 0.30% GNI
2027: 0.28% - 0.33% GNI
2028: 0.30% - 0.35% GNI
Expectations of net ODA received (% GNI) of the Philippines in the coming years may depend on many factors, including economic policy, international situation, and others.
2024: 0.15% - 0.20% GNI
2025: 0.16% - 0.21% GNI
2026: 0.17% - 0.22% GNI
2027: 0.18% - 0.23% GNI
2028: 0.19% - 0.24% GNI

6. Team Time Series Conclusion

The models helped determine the general trend of net ODA received (% of GNI) for Argentina and the Philippines over a given period. This trend can be increasing, decreasing, or stable. By analyzing the models, we can assess the variability of net ODA received (% of GNI) and identify the factors that influence this variability. This can help governments and policy managers identify the causes and effects of fluctuations on the economy and society.
Results from the models can support policy decisions by providing information on long-term trends and short-term fluctuations in net ODA. This can support the development of policy strategies to optimize the use of ODA and promote sustainable development in Argentina and the Philippines, thereby supporting policy decisions and the socio-economic development of the country.

7. Overall Team Conclusion

The analysis of Net Official Development Assistance (ODA) received as a percentage of Gross National Income (GNI) in the Philippines and Argentina is critical because it allows readers

to understand the factors driving the shift in international development assistance. This article used the findings of numerous regression and time series studies to uncover and evaluate the impact of various factors on the ODA received by these two nations with contrasting features.

The analysis of the issue indicates a complicated sequence of factors influencing the ODA received. Despite using the same data, the two nations under consideration show significant variances. The regression study found that renewable energy consumption, exports of products and services, and urban population growth all had a significant impact on the Philippines' net ODA. The model was extremely explanatory; it could explain 94% of the variance in ODA, demonstrating its excellent predictive capacity and understanding of the elements that drive it. Furthermore, higher renewable energy imports and exports were connected with increased ODA allocation to nations, but urban population growth was negatively associated.

The time series study yielded forecasts for each nations' net ODA trends throughout the five-year period 2024-2028. It expected that the share of net ODA received would continuously rise in both countries, implying a positive future for external development aid. This projection is especially essential in terms of planning and policymaking because it allows both countries to develop plans for making the most use of the help they receive.

8. References:

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