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The Impact of FDI, Remittances, and Inflation Rates on the Economic Growth in Egypt 1990-2020 using STATA

by

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Abstract

Our main aim is to find out how Foreign Direct Investment (FDI) affects the Economic Growth Rate (GDP) in Egypt over 31 years (1990-2020). In order to do so correctly, we take into account other determinants of Economic Growth- namely, Remittances, and Inflation Rates. The methodology employed is a multiple regression analysis model.

In accordance with previous literature, the findings of the used empirical analysis show that there is a positive and significant relationship between FDI and Economic Growth. Additionally, it was found that Remittances also have a significant impact on Economic growth. However, Inflation Rates were found to have an insignificant negative relationship with Economic Growth.

Therefore, we recommend that Egypt attracts more FDI and Remittance in order to improve its rate of economic growth.

Chapter One: Introduction and Literature Review

1.1 Introduction

Gross Domestic Product (GDP) is an important measure of the size of an economy and its economic performance. Economic Growth Rate is the rate at which a nation's Gross Domestic Product (GDP) changes and grows from one year to another. There are various determinants of economic growth including, inter alia, foreign direct investment (FDI). Our aim is to study the extent to which FDI affects economic growth.

1.1.1 Main Question

Does FDI affect the Economic Growth Rate?

1.1.2 Sub questions

- What is FDI and Economic Growth Rate?
- Is there a relationship between FDI and the Economic Growth Rate?
- What is Inflation Rate and its effect on Economic Growth?
- What is Remittance and its effect on Economic Growth?

1.1.3 Used Definitions

- Gross Domestic Product (GDP) is a monetary measure of the market value of all the final goods and services produced in a year.
- Foreign Direct Investment (FDI) is a direct investment by a resident of one economy in an enterprise that is resident in another country.
- Remittance is the transfer of money across national boundaries by migrants.
- Inflation Rate is the percentage change of price index over time.

1.1.4 Used Variables

Dependent Variable (Y) : Economic Growth (GDP) - Continuous (numeric)

Independent Variables (Xs) :

- Foreign Direct Investment (FDI) - Continuous (numeric)
- Remittance - Continuous (numeric)
- Inflation Rates - Continuous (numeric)

1.1.5 Hypothesis

H0: There is no significant relationship between FDI and Economic Growth.

H1: There is a significant relationship between FDI and Economic Growth.

1.2 Literature Review

According to new growth theories, the importance of FDI to enhance economic growth through financing new investment and technology transfer has been accepted (Sala & Travin, 2014)[1].

[1] The Impact of Foreign Direct Investment (FDI) on Economic Growth in Eastern Africa: Evidence from Panel Data Analysis by Seiko Minota Zekarias, p.3 - Applied Economics and Finance Journal; Vol.3, No.1; February 2016 (https://www.researchgate.net/profile/Zekarias-Minota-Seiko/publication/291387056_The_Impact_of_Foreign_Direct_Investment_FDI_on_Economic_Growth_in_Eas

Although there is empirical evidence stating that FDI is necessary for economic growth, others postulate that the effect of FDI depends on other factors such as macroeconomic stability (Alege & Ogundipe, 2013). "Generally, the empirical evidence shows different results; positive, marginal, negative, and neutral effects of FDI on growth."[2]

Although there is research concluding that FDI is not the answer for desired economic growth[3], it still acknowledges that FDI and Economic Growth are closely related.

Sukar and Hassan (2011) investigated the effects of foreign direct investment on economic growth in sub-Saharan Africa by using 25 years of panel data from 1975 to 1999.[4] Finally, their results indicated that FDI has a marginally significant positive effect on economic growth.

1.3 Study Objectives

The focus of the study is to establish that FDI has a positive significant impact on Economic Growth as measured by GDP. Other variables are also considered to back the data results.

The variables used are GDP growth (as a dependent variable), FDI, Remittance, and Inflation Rates (as independent variables). We measure the degree of correlation between these variables and then enact a regression analysis to test this relationship.

This study has limitations which include the fact that the sample size is limited to 31 years of data collected in Egypt, as well as, the limitations that are a result of using the regression model or else it would give misleading results, such as homoscedasticity.

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tern_Africa_Evidence_from_Panel_Data_Analysis/links/601af57292851c4ed5490001/The-Impact-of-Foreign-Direct-Investment-FDI-on-Economic-Growth-in-Eastern-Africa-Evidence-from-Panel-Data-Analysis.pdf)

[2] Ibid

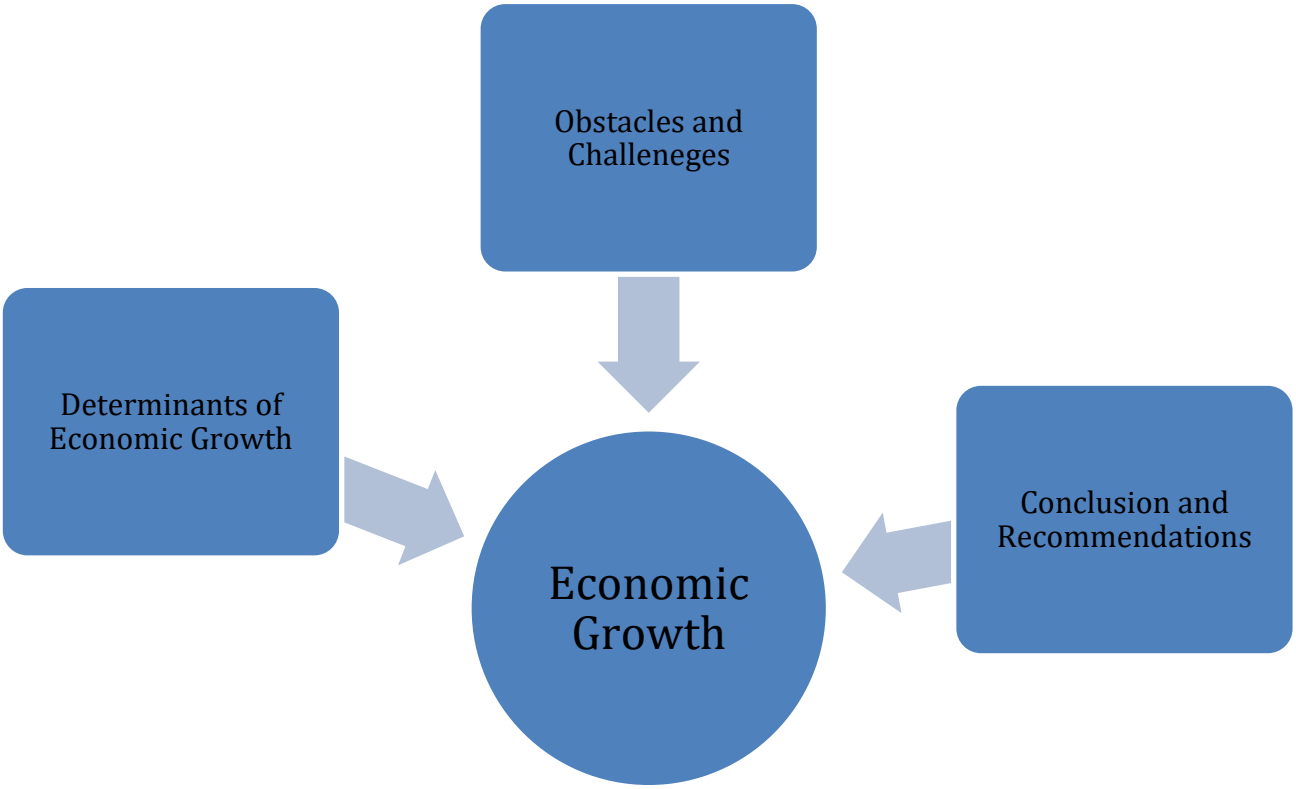
[3] Investigating the Impact of FDI on Economic Growth in Zambia: 1980 - 2012 by Eugene Maliwa & Jacob M. Nyambe, p.1 - European Journal of Business, Economics and Accountancy; Vol. 3, No. 3; 2015 (https://www.researchgate.net/profile/Dr-Jacob-M-Nyambe/publication/277313238_INVESTIGATING_THE_IMPACT_OF_FDI_ON_ECONOMIC_GROWTH_IN_ZAMBIA_1980_-_2012/links/5567587108aec2268300fb92/INVESTIGATING-THE-IMPACT-OF-FDI-ON-ECONOMIC-GROWTH-IN-ZAMBIA-1980-2012.pdf)

[4] The Effects of Foreign Direct Investment on Economic Growth: The Case of Sub-Sahara Africe by Sukar, Ahmed, and Hassan (2011) (https://swer.wtamu.edu/sites/default/files/Data/61-74-54-198-1-PB.pdf)

Chapter Two: Framework and Methodology

2.1 Conceptual Framework

Conceptual Framework Diagram



2.2 Data Source

The data used for this research is secondary data that was selected from the data banks of the Central Bank of Egypt's and World Bank websites. The links are as follows:

- https://data.worldbank.org
- www.cbe.org.eg
- www.capmas.gov.eg

All of this data was entered into an excel sheet as seen:

year	economic Growth%	$net inward FDI (million)	Personal remittances, re	inflation rate%
1990	5.667	734	4,284	16.76
1991	1.125	253	4,054	19.75
1992	4.473	459	6,104	13.64
1993	2.901	493	5,664	12.09
1994	3.973	1,256	3,672	8.15
1995	4.642	598	3,226	15.74
1996	4.989	636	3,107	7.19
1997	5.492	891	3,697	4.63
1998	5.575	1,076	3,370	3.87
1999	6.053	1,065	3,235	3.08
2000	6.370	1,235	2,852	2.68
2001	3.535	510	2,911	2.27
2002	2.390	647	2,893	2.74
2003	3.193	237	2,961	4.51
2004	4.092	1,253	3,341	11.27
2005	4.472	5,376	5,017	4.87
2006	6.844	10,043	5,330	7.64
2007	7.088	11,578	7,656	9.32
2008	7.156	9,495	8,694	18.32
2009	4.674	6,712	7,150	11.76
2010	5.147	6,386	12,453	11.27
2011	1.765	(483)	14,324	10.06
2012	2.226	2,798	19,236	7.11
2013	2.185	4,192	17,833	9.47
2014	2.916	4,612	19,570	10.07
2015	4.372	6,925	18,325	10.37
2016	4.347	8,107	18,590	13.81
2017	4.181	7,409	24,737	29.51
2018	5.314	8,141	25,516	14.40
2019	5.558	9,010	26,781	9.15
2020	3.570	5,852	29,603	5.04

2.3 Methodology

A multi regression analysis model (least square) is conducted to identify which variables (FDI, Remittances and Inflation Rates) have a significant impact on Economic Growth. STATA software is used for calculations. The target population of the research is the GDP of Egypt over the time period from 1990 to 2020.

Chapter Three: Descriptive Analysis

3.1 Variables' Summary

An undetailed summary of the variables is as follows:

Variable	Obs	Mean	Std. Dev.	Min	Max
year	0				
economicGr~h	31	4.396347	1.568677	1.125405	7.156284
netinwardF~n	31	3790.16	3660.35	-482.7	11578.1
Personalre~m	31	10199.6	8565.984	2852	29602.9
inflationr~e	31	10.01766	5.970417	2.269757	29.50661

Thus, the number of observations of all the variables are unanimous (31).

3.2 Confidence Interval

Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
economicGr~h	31	4.396347	.2817428	3.820952	4.971743
netinwardF~n	31	3790.16	657.4184	2447.532	5132.787
Personalre~m	31	10199.6	1538.496	7057.572	13341.63
inflationr~e	31	10.02	1.07	7.83	12.21

3.3 Pearson Correlation

	econom~h	netinw~n	Person~m	inflat~e
economicGr~h	1.0000			
netinwardF~n	0.4788	1.0000		
Personalre~m	-0.1581	0.5489	1.0000	
inflationr~e	-0.0387	0.2718	0.2987	1.0000

From the pearson correlation table above, we can conclude that there is:

- A positive correlation between Economic growth and FDI.
- A weak negative correlation between Economic growth and Remittances.
- A very weak negative correlation between Economic growth and Inflation rates.

3.4 Skewness/ Kurtosis Test of Normality

Skewness/Kurtosis tests for Normality

				joint	
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
economicGr~h	31	0.7010	0.5436	0.53	0.7654
netinwardF~n	31	0.1452	0.0433	5.83	0.0542
Personalre~m	31	0.0263	0.6029	5.09	0.0783
inflationr~e	31	0.0083	0.0329	9.53	0.0085

3.6 Detailed Variables' Summary

3.6.1 Economic Growth (Dependent Variable)

Detailed Summary

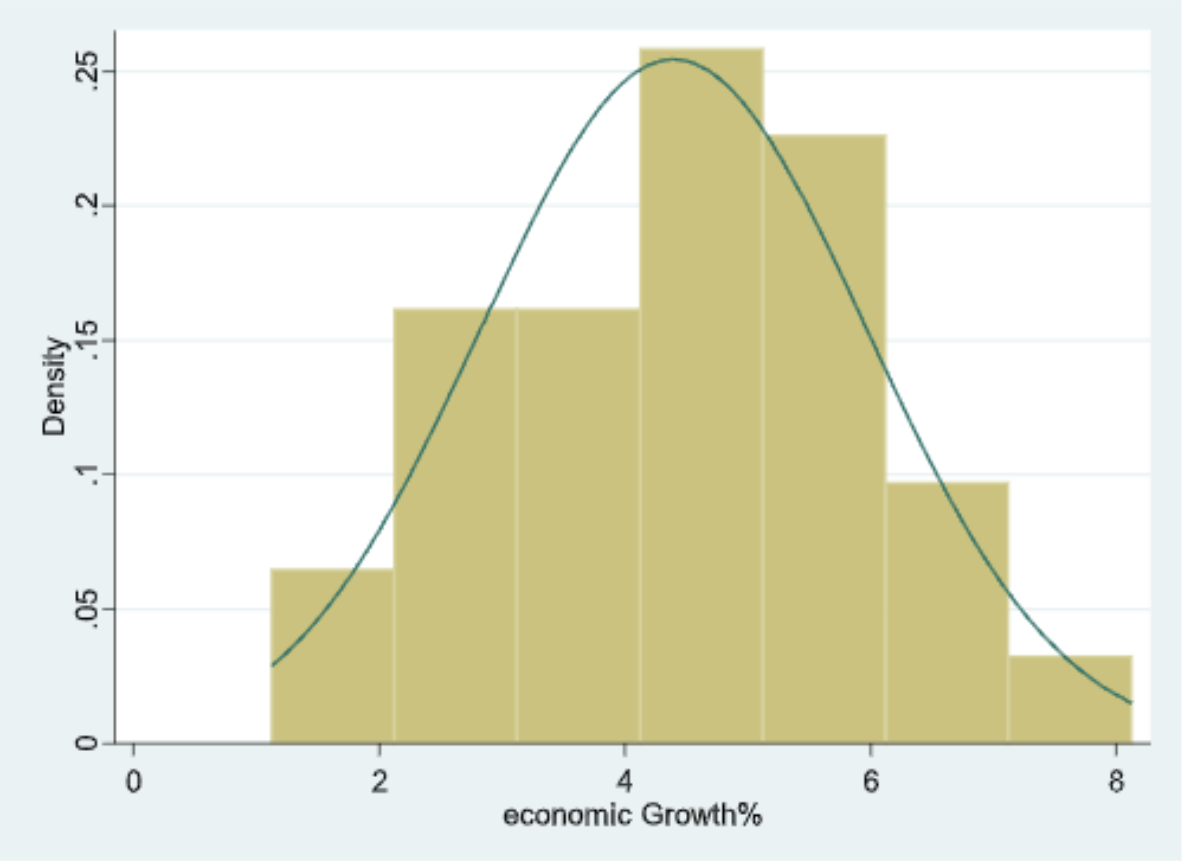
economic Growth%

	Percentiles	Smallest		
1%	1.125405	1.125405		
5%	1.764572	1.764572		
10%	2.2262	2.185466	Obs	31
25%	3.193455	2.2262	Sum of Wgt.	31
50%	4.471744		Mean	4.396347
		Largest	Std. Dev.	1.568677
75%	5.557684	6.370004		
90%	6.370004	6.843838	Variance	2.460749
95%	7.087827	7.087827	Skewness	-.1451719
99%	7.156284	7.156284	Kurtosis	2.364808

We can conclude the following:

- 50% of the observations of the economic growth variable is equal or less than 4.5%.
- The Mean = 4.40%.
- The Median = 4.47%.
- Standard Deviation = 1.57.
- Skewness = -0.15 and Kurtosis = 2.36.

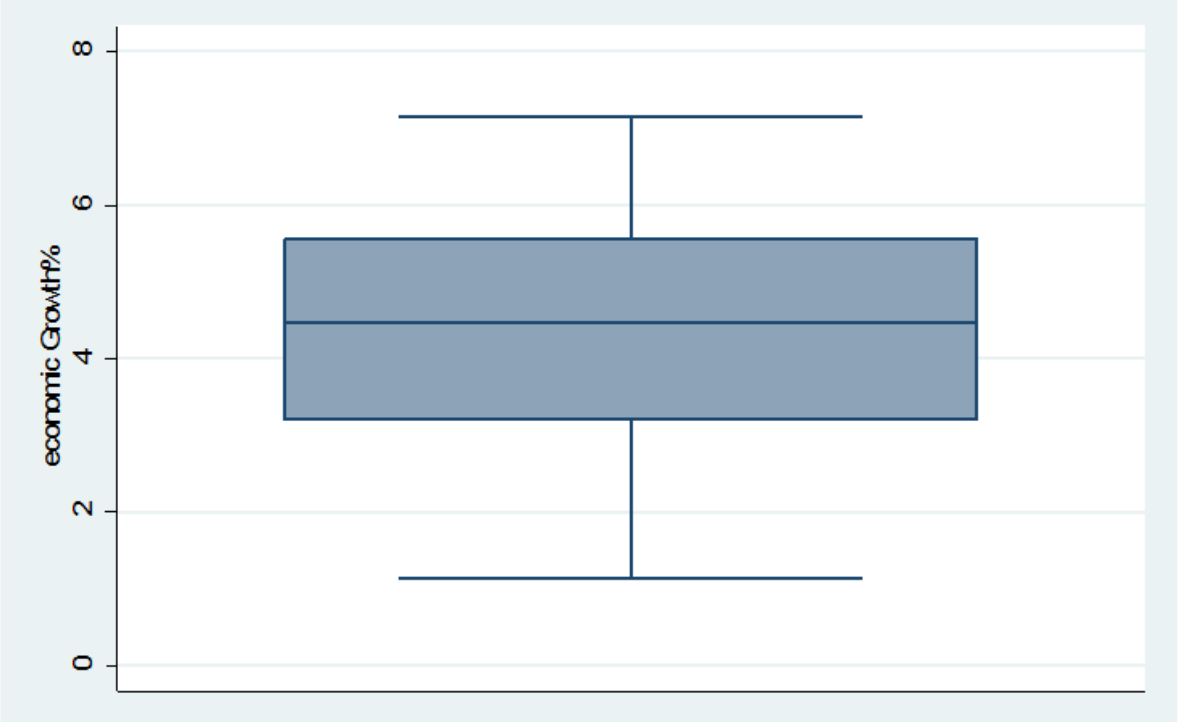
Histogram- Economic Growth



We can conclude the following:

- The economic growth variable follows the normal distribution (symmetrical Distribution).
- The mode is approximately equal to the mean and the median.
- No extreme outliers.

Boxplot- Economic Growth



We can conclude the following:

- Economic Growth Variable follows the normal distribution.
- The interquartile range = Q3-Q1 = 2.37
- Min = 1.12 Max= 7.16
- First Quartile (Q1) = 3.19; Second Quartile (Q2) = 4.47; Third Quartile = 5.56
- No extreme outliers.

3.6.2 FDI

Detailed summary

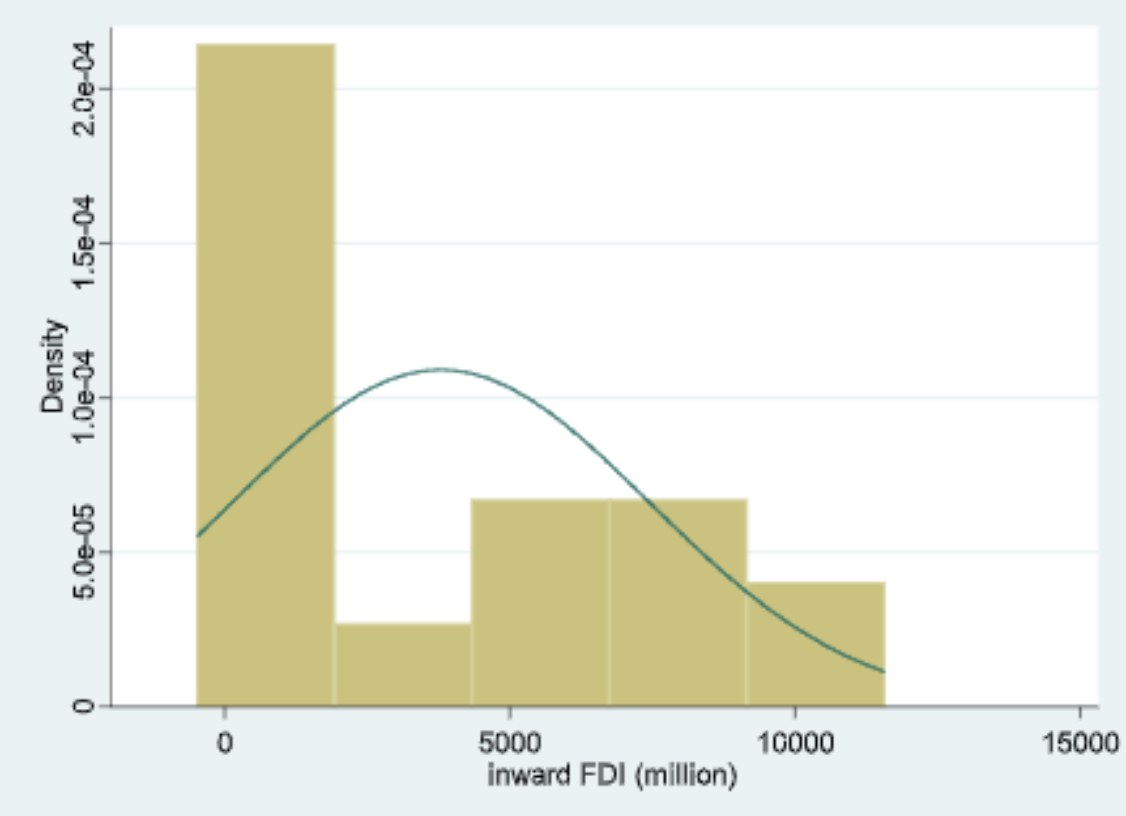
$net inward FDI (million)

	Percentiles	Smallest		
1%	-482.7	-482.7		
5%	237.4	237.4		
10%	459	253	Obs	31
25%	636	459	Sum of Wgt.	31
50%	1256		Mean	3790.16
		Largest	Std. Dev.	3660.35
75%	6925.2	9010.1		
90%	9010.1	9494.6	Variance	1.34e+07
95%	10042.8	10042.8	Skewness	.5719926
99%	11578.1	11578.1	Kurtosis	1.885317

From the above summary table, we can conclude the following:

- 50% of the observations of the FDI variable is equal or less than 1256 $m
- The median = 1256 $m
- The mean = 3790.16 $m
- First Quartile (Q1) = 636; Second Quartile (Q2) = 1256; Third Quartile = 6925.2.
- Skewness = .5719926; Kurtosis = 1.885317.
- Standard Deviation = 3660.3**5.**

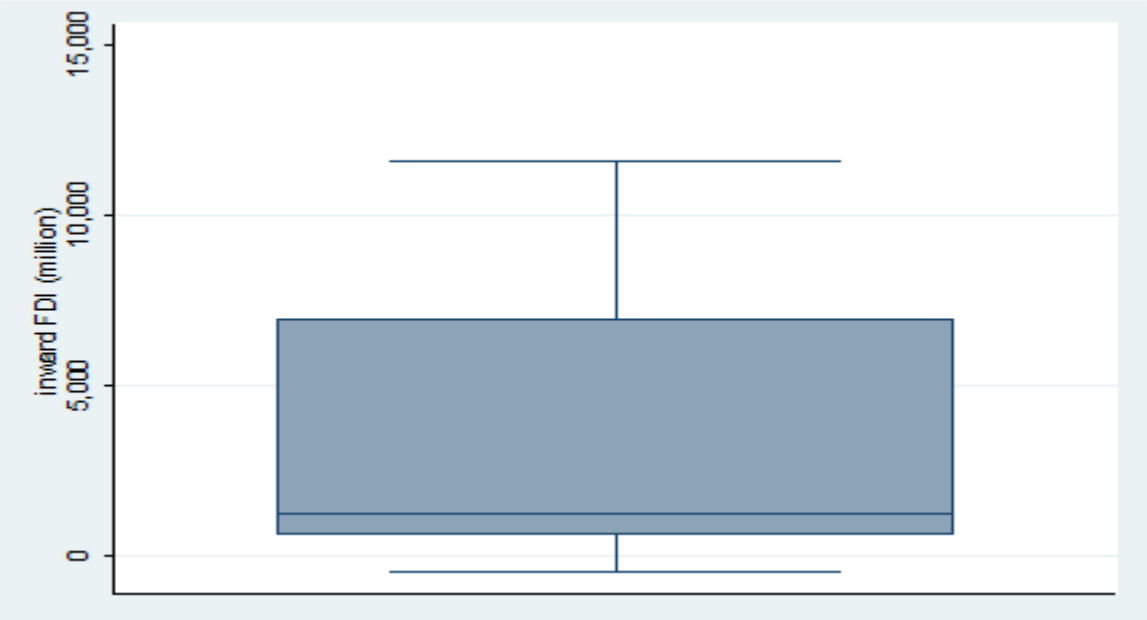
Histogram - FDI



From the above histogram, we can conclude the following:

- FDI variable doesn't follow the normal distribution.
- The FDI variable is positively skewed.
- Mean is greater than the median**.**

Box plot - FDI:



From the above Box plot, we can conclude the following:

- There are no extreme outliers.
- First Quartile (Q1) = 636; Second Quartile (Q2) = 1256; Third Quartile = 6925.2.
- The FDI variable is positively skewed.
- Min= -482.7 Max = 11578.1
- Interquartile Range = Q3 –Q1= 6289.5.

3.6.3 Remittance

Detailed Summary

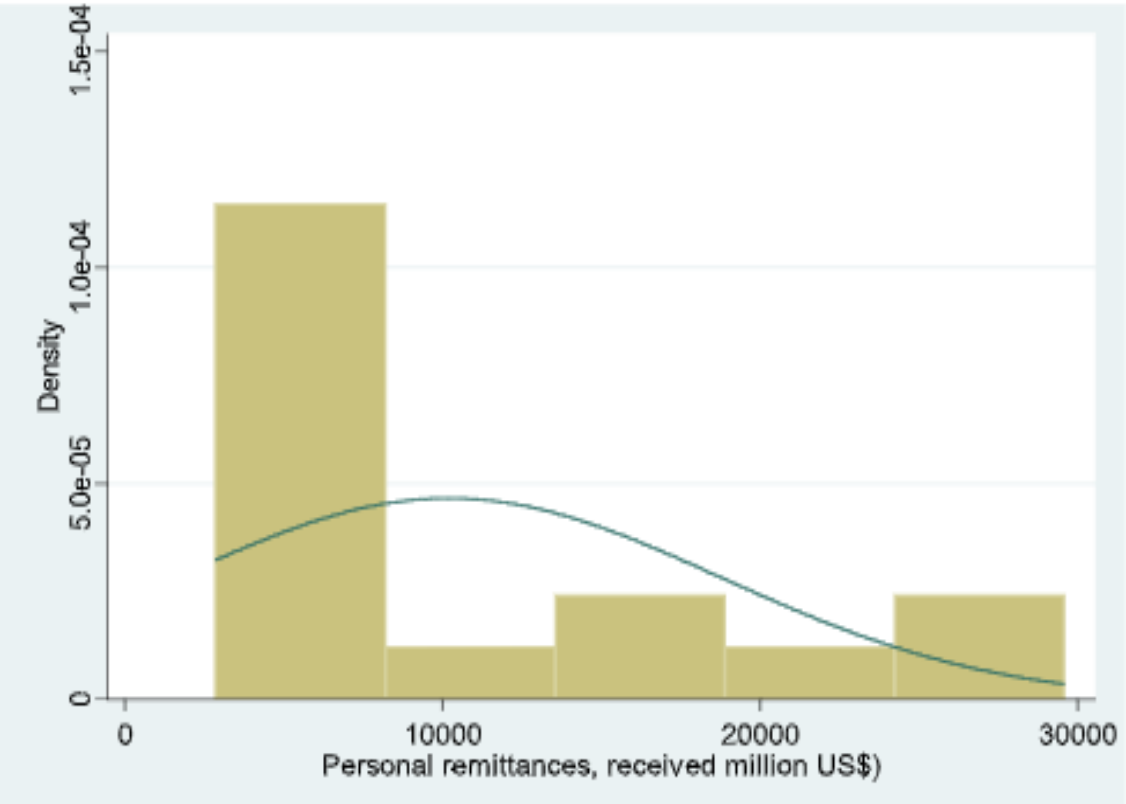
Personal remittances, received million US$)

	Percentiles	Smallest		
1%	2852	2852		
5%	2893.1	2893.1		
10%	2960.9	2911.4	Obs	31
25%	3340.7	2960.9	Sum of Wgt.	31
50%	5664		Mean	10199.6
		Largest	Std. Dev.	8565.984
75%	18325.4	24737.4		
90%	24737.4	25515.7	Variance	7.34e+07
95%	26781.4	26781.4	Skewness	.9196495
99%	29602.9	29602.9	Kurtosis	2.404139

From the above summary table, we can conclude the following:

- The 50% of the observations of the FDI variable is equal or less than 5664 $m.
- The median = 5664 $m.
- The mean = 10199.6 $m.
- First Quartile (Q1) = 3340.7; Second Quartile (Q2) = 5664; Third Q= 18325.4.
- Skewness = 0.919; Kurtosis= 2.404.
- Standard Deviation = 8565.98.

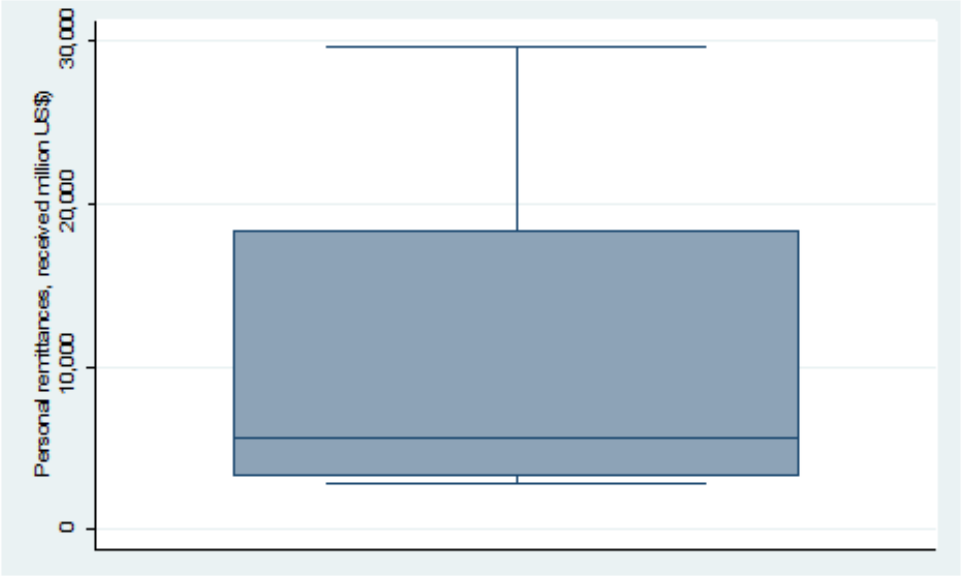
Histogram - Remittance



From the above histogram, we can conclude the following:

- Personal Remittances Variable doesn't follow the normal distribution.
- The Personal Remittances variable is positively skewed.
- Mean is greater than the median.

Box plot - Remittances:



From the above Box Plot, we can conclude the following:

- Min = 2852 Max= 29602.9.
- Interquartile range = Q3-Q1 = 14984.
- The median = 5664 $m.
- First Quartile (Q1) = 3340.7; Second Quartile (Q2) = 5664; Third Quartile = 18325.4.
- The Personal Remittances variable is positively skewed.
- There are no extreme outliers.

3.6.4 Inflation Rate

Detailed Summary

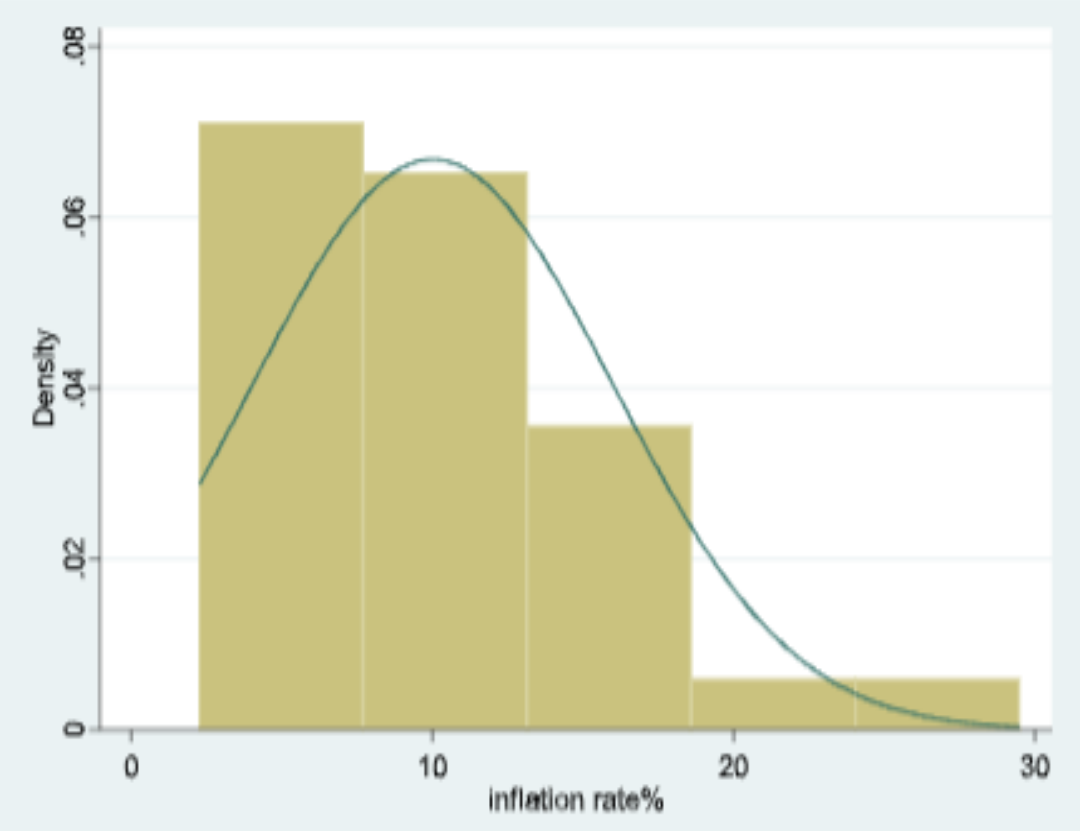
inflation rate%

	Percentiles	Smallest		
1%	2.269757	2.269757		
5%	2.683805	2.683805		
10%	3.079499	2.737239	Obs	31
25%	4.869397	3.079499	Sum of Wgt.	31
50%	9.46972		Mean	10.01766
		Largest	Std. Dev.	5.970417
75%	13.63742	16.75637		
90%	16.75637	18.31683	Variance	35.64588
95%	19.74854	19.74854	Skewness	1.135252
99%	29.50661	29.50661	Kurtosis	4.830687

From the above summary table, we can conclude the following:

- 50% of the observations of the inflation rate variable is equal or less than 9.46%.
- The median = 9.46%.
- The mean = 10%.
- First Quartile (Q1) = 4.9%; Second Quartile (Q2) = 9.4%; Third Quartile = 13.6%.
- Standard Deviation = 5.970417.

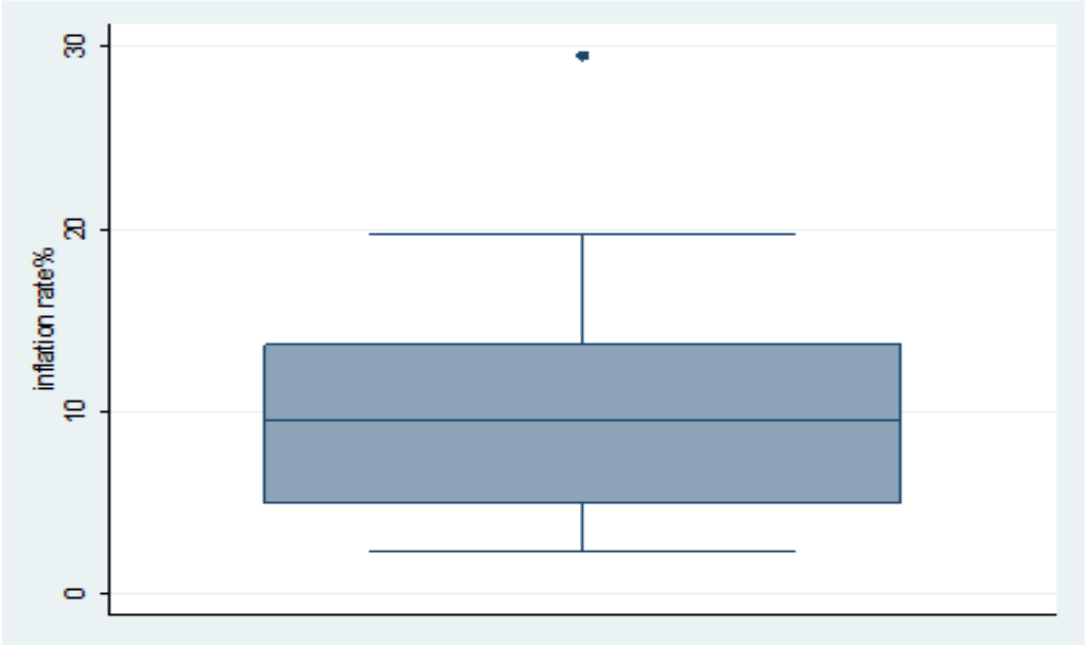
Histogram - Inflation Rate



From the above histogram, we can conclude the following:

- Inflation Rate Variable doesn't follow the normal distribution.
- The Inflation Rate variable is positively skewed.
- There are extreme positive outliers.
- Mean is greater than the median.

Box plot - Inflation Rate:



From the above Box plot, we can conclude the following:

- Min = 2.26 Max= 29.506.
- The median = 9.4%.
- First Quartile (Q1) = 4.9%; Second Quartile (Q2) = 9.4%; Third Quartile = 13.6%.
- Interquartile range = Q3-Q1 = 8.7%.
- The inflation rate variable is positively skewed.
- There is an outlier. This outlier can be explained by the turbulent political unrest.

3.7 Shapiro Wilk test of Normality

Figure (1):

Variable	Obs	W	V	z	Prob>z
economicGr~h	31	0.98077	0.626	-0.970	0.83386
netinwardF~n	31	0.86005	4.558	3.143	0.00084
Personalre~m	31	0.80357	6.398	3.846	0.00006
inflationr~e	31	0.91731	2.694	2.053	0.02004

Figure (1) shows that:

H0: Variable is normally distributed

H1: Variable is not normally distributed

For all the three variables (net inward FDI, personal remittance, and inflation rates), their p-values are less than the alpha, as they are less than 0.05; therefore, we are going to reject H0- they are not normally distributed variables. On the other hand, the p-value for economic growth is greater than the alpha, as it is equal to 0.83; thus, we will not reject H0- economic growth is normally distributed.

Figure (2):

```
. swilk log_EcoGrowth log_FDI log_remittance log_inflation

                    Shapiro-Wilk W test for normal data

    Variable |        Obs        W           V           z       Prob>z
-------------+-------------------------------------------------------
log_EcoGro~h |         31    0.91530       2.759       2.103     0.01775
     log_FDI |         30    0.89584       3.311       2.475     0.00666
log_remitt~e |         31    0.86871       4.277       3.011     0.00130
log_inflat~n |         31    0.96301       1.205       0.386     0.34977

.
```

It is worth mentioning that a log transformation to the variables was conducted. As a result, we can deduce that all variables are not normally distributed except for the inflation rate which became normally distributed.

It became clear that after the log transformation, economic growth became not normal; therefore, the log transformation was not efficient to our data.

Chapter Four: Regression Analysis

4.1 Regress FDI on Economic Growth

```
. regress economicGrowth netinwardFDImillion
```

Source	SS	df	MS		
Model	16.9258346	1	16.9258346	Number of obs	= 31
Residual	56.89663	29	1.96195276	F(1, 29)	= 8.63
				Prob > F	= 0.0064
Total	73.8224645	30	2.46074882	R-squared	= 0.2293
				Adj R-squared	= 0.2027
				Root MSE	= 1.4007

economicGrowth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
netinwardFDImillion	.0002052	.0000699	2.94	0.006	.0000623	.0003481
_cons	3.618581	.3652506	9.91	0.000	2.871559	4.365602

4.2 Regress FDI and Remittances on Economic Growth

Source	SS	df	MS		
Model	35.6459334	2	17.8229667	Number of obs	= 31
Residual	38.1765311	28	1.36344754	F(2, 28)	= 13.07
				Prob > F	= 0.0001
Total	73.8224645	30	2.46074882	R-squared	= 0.4829
				Adj R-squared	= 0.4459
				Root MSE	= 1.1677

economicGrowth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
netinwardFDImillion	.0003469	.0000697	4.98	0.000	.0002042	.0004896
Personalremittancesreceivedm	-.0001103	.0000298	-3.71	0.001	-.0001713	-.0000493
_cons	4.206735	.3433745	12.25	0.000	3.503364	4.910105

4.3 Regress FDI, Remittances, and Inflation Rates on Economic Growth

Table (1):

Source	SS	df	MS		
Model	36.1581658	3	12.0527219	Number of obs	= 31
Residual	37.6642987	27	1.39497403	F(3, 27)	= 8.64
				Prob > F	= 0.0003
Total	73.8224645	30	2.46074882	R-squared	= 0.4898
				Adj R-squared	= 0.4331
				Root MSE	= 1.1811

economicGro~h	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
inflationrate	-.0231453	.0381955	-0.61	0.550	-.1015161	.0552255
Personalrem~m	-.0001069	.0000306	-3.49	0.002	-.0001698	-.000044
netinwardFD~n	.0003527	.0000711	4.96	0.000	.0002068	.0004987
_cons	4.381307	.4512507	9.71	0.000	3.455417	5.307197

From the above data, it is clear that there is a significant relationship between Economic growth and FDI, as well as a significant relationship between Economic growth and Personal Remittance. Moreover, the personal remittance helped in explaining more in the variation in the data as the Adj- R-squared increased from 0.20 to 0.44 after adding the Personal Remittance variable to our model. This is in addition to the Root MSE that decreased from 1.4 to 1.16; this also confirms that the variable personal remittance increased the efficiency of our model as it helped in decreasing the root of mean square error.

Table (2):

Source	SS	df	MS	Number of obs	=	31
				F(3, 27)	=	8.64
Model	36.1581658	3	12.0527219	Prob > F	=	0.0003
Residual	37.6642987	27	1.39497403	R-squared	=	0.4898
				Adj R-squared	=	0.4331
Total	73.8224645	30	2.46074882	Root MSE	=	1.1811

economicGro~h	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
inflationrate	-.0231453	.0381955	-0.61	0.550	-.1015161	.0552255
Personalrem~m	-.0001069	.0000306	-3.49	0.002	-.0001698	-.000044
netinwardFD~n	.0003527	.0000711	4.96	0.000	.0002068	.0004987
_cons	4.381307	.4512507	9.71	0.000	3.455417	5.307197

H_0: $\beta = 0$

H_1: $\beta \neq 0$

From the above table, we can deduce that we can not reject Ho for the variable inflation rate as it's p-value is 0.550 (Greater than alpha = 0.05), on the other hand we will reject Ho for the other two variables net inward FDI and Personal remittance.

The regression model shows Adj R-squared = 0.48, which means that 48% of the variation in the model was explained by our independent variables.

The Root MSE increased and the adj-R-squared decreased after adding the variable inflation rate to the model. This indicates that we can remove this variable from our model as it does not help in explaining the variation.

In conclusion, the Regression Model will be:

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$

$$Y = 4.38 + 0.00035FDI + 0.00011Remittance - 0.023\,Inflation + \varepsilon$$

4.4 Regression Model after Log Transformation

```
. regress log_EcoGrowth log_FDI log_remittance log_inflation
```

Source	SS	df	MS	Number of obs	=	30
				F(3, 26)	=	6.69
Model	.40020493	3	.133401643	Prob > F	=	0.0017
Residual	.518075553	26	.019925983	R-squared	=	0.4358
				Adj R-squared	=	0.3707
Total	.918280483	29	.031664844	Root MSE	=	.14116

log_EcoGrowth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
log_FDI	.3198105	.0718416	4.45	0.000	.1721381	.4674829
log_remittance	-.3942111	.1162034	-3.39	0.002	-.6330707	-.1553516
log_inflation	.0082384	.1035775	0.08	0.937	-.2046682	.221145
_cons	1.068967	.2941605	3.63	0.001	.4643114	1.673622

It is worth mentioning that a log transformation was performed to our model. However, the results pertaining to our specific question are still largely the same as without log transformation.

The model in the case is:

$\log Y = \log\beta_0 + \log\beta_1 X_1 + \log\beta_2 X_2 + \log\beta_3 X_3 + \varepsilon$

$$Y = 1.068 + 0.3198FDI - 0.3942Remittance + O.O082\ Inflation + \varepsilon$$

4.5 Regression Assumptions

1- Homoscedasticity:

```
. estat hettest netinwardFDImillion Personalremittancesreceivedm inflationrate

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: netinwardFDImillion Personalremittancesreceivedm inflationrate

         chi2(3)      =     3.38
         Prob > chi2  =   0.3362

.
```

H0: Constant Variance Vs. H1: Non Constant Variance

As shown in the above figure, the p-value = 0.33 is greater than alpha which is 0.05, therefore, we will not reject H0 and the assumption of constant variance is true then the data shows homoscedasticity, which is where the variances along the line of best fit remain similar as you move along the line.

2- Multicollinearity:

```
. estat vif
```

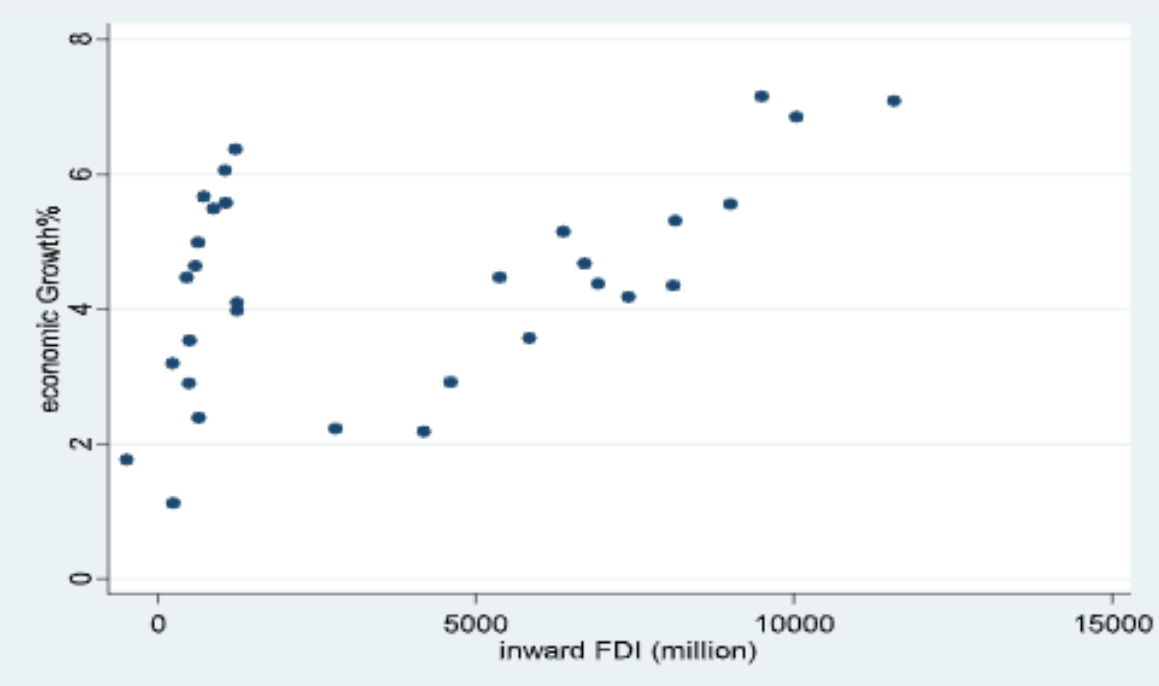
Variable	VIF	1/VIF
Personalre~m	1.48	0.674626
netinwardF~n	1.46	0.685978
inflationr~e	1.12	0.894150
Mean VIF	1.35	

.

The above test is VIF (Variance Inflation Factor), it provides a measure of multicollinearity among the independent variables in a multiple regression model. A large variance inflation factor (VIF) on an independent variable indicates a highly collinear relationship to the other variables that should be considered or adjusted for in the structure of the model and selection of independent variables. Since all VIF of all our independent variables in the model is less than 4, then this indicates no multicollinearity between variables.

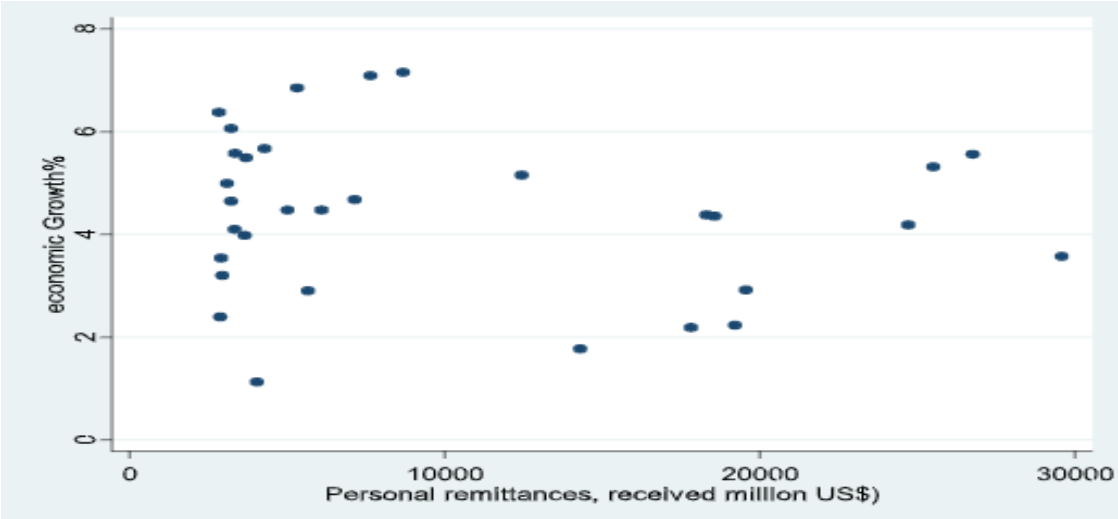
3- The linear relationship between independent and dependent variables:

Scatter Plot - FDI & Economic Growth



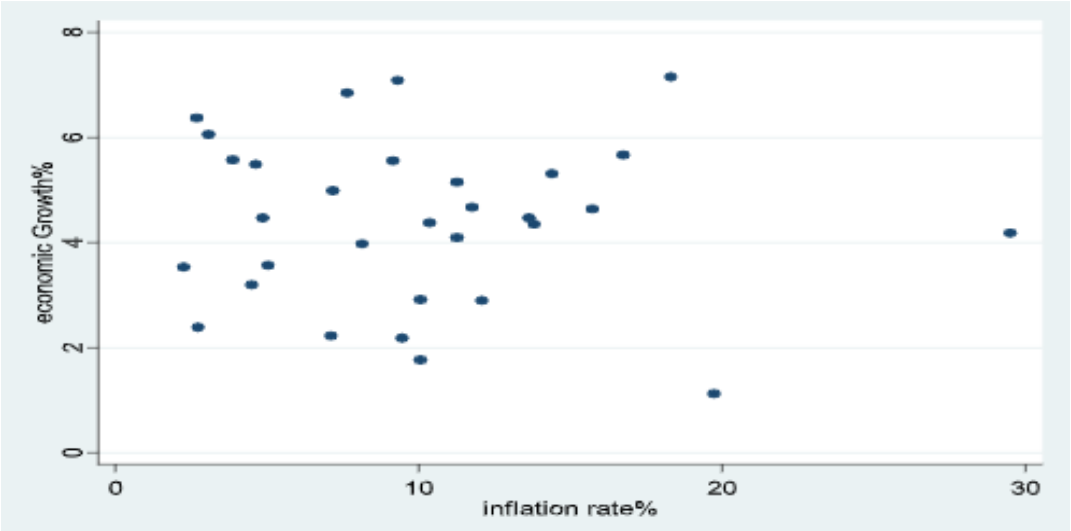
From the Scatter Plot above, we can conclude that there is approx. positive linear relationship between Economic Growth and FDI.

Scatter Plot - Remittance & Economic Growth



From the Scatter Plot above, we can conclude that there is no clear pattern relationship between Economic Growth and Remittance**.**

Scatter Plot - Inflation Rate and Economic Growth



From the Scatter Plot above, we can conclude that there isn't a clear linear relationship between the two variables.

Chapter Five: Limitations, Conclusions and Recommendations

5.1 Limitations

Firstly, the sample size used which is 31 may be too small to be able to extrapolate significantly accurate and consistent data than if a larger sample was used.

Secondly, there are other variables that might have been added to the model that could have an impact on the relationship between FDI and Economic Growth such as exports and imports.

Thirdly, the methodology used in the form of the multiple regression analysis model has it's well-known advantages; however, it has its own limitations as well, whereby its assumptions need to be either satisfied or the regression model would give misleading results, as we illustrated above there is no linear relationship between the inflation rate (independent variable) and the economic growth (dependent variable) and between Remittances and economic Growth.

Fourthly, some of the independent variables aren't normal, even after making a transformation for the variables by taking the log.

Finally, there is an outlier on the Inflation Rate variable, we don't recommend omitting this value because we are dealing with time series data.

5.2 Conclusion

In conclusion, it is clear from the regression model that there is a significant relationship between FDI and Economic Growth. It was also shown that Remittance has a significant impact on Economic growth as is evident in the increase of adj-R-squared from 0.2 to 0.44 when we added remittance as a second variable. Thus, 44% of the variation in the model is explained by these two variables (FDI and Remittance). Although our findings indicate that there is a negative linear relationship between the Remittances and economic growth, this finding doesn't make an economic sense, and there might be some other factors outside our model which affect the two variables.

On the other hand, Inflation Rates have been found to have an insignificant negative relationship with Economic Growth as this variable did not add too much explanation to our model as the adj-R-squared decreased to 0.43 and Root MSE increased from 1.16 to 1.18.

To summarize, FDI and Remittance were found to have a significant relationship with Economic Growth, while Inflation Rates have an insignificant negative relationship with Economic Growth.

5.3 Recommendations

We recommend that the Egyptian Government should provide more incentives for the Forign investors to increase the volume of the foreign direct investment, which will reflect in accelerating economic growth.

5.4 Appendix

The data used in this research was put into a spreadsheet as shown:

year	economic Growth%	$net inward FDI (million)	Personal remittances, re	inflation rate%
1990	5.667	734	4,284	16.76
1991	1.125	253	4,054	19.75
1992	4.473	459	6,104	13.64
1993	2.901	493	5,664	12.09
1994	3.973	1,256	3,672	8.15
1995	4.642	598	3,226	15.74
1996	4.989	636	3,107	7.19
1997	5.492	891	3,697	4.63
1998	5.575	1,076	3,370	3.87
1999	6.053	1,065	3,235	3.08
2000	6.370	1,235	2,852	2.68
2001	3.535	510	2,911	2.27
2002	2.390	647	2,893	2.74
2003	3.193	237	2,961	4.51
2004	4.092	1,253	3,341	11.27
2005	4.472	5,376	5,017	4.87
2006	6.844	10,043	5,330	7.64
2007	7.088	11,578	7,656	9.32
2008	7.156	9,495	8,694	18.32
2009	4.674	6,712	7,150	11.76
2010	5.147	6,386	12,453	11.27
2011	1.765	(483)	14,324	10.06
2012	2.226	2,798	19,236	7.11
2013	2.185	4,192	17,833	9.47
2014	2.916	4,612	19,570	10.07
2015	4.372	6,925	18,325	10.37
2016	4.347	8,107	18,590	13.81
2017	4.181	7,409	24,737	29.51
2018	5.314	8,141	25,516	14.40
2019	5.558	9,010	26,781	9.15
2020	3.570	5,852	29,603	5.04

5.5 References

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