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DETERMINANTS OF EXCHANGE RATES IN UGANDA (2001-2020)

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ABSTRACT: *The rate of fluctuation of exchange rate in Uganda has been on a rise and this prompted study to examine the major determinants and also analyze the real effective exchange rate. It was guided by these objectives: to examine the effect of exports on exchange rate, to determine the effect of inflation on exchange rate and to investigate the effect of interest rates on exchange rate in Uganda. A quantitative research approach was used using secondary data for the period 2001-2020. Numerous diagnostic tests were conducted to determine the econometric properties of the variables. Assessments on heteroscedasticity indicate that there was constant variance in the series since the P-value 0.0485 >0.05 there by concluding that there's homoscedasticity, while the autocorrelation test provided evidence of serial correlations in the residuals. Tests on stationarity indicated that there was stationarity in the variables inflation and interest rates whereas exports and exchange rate were non-stationary at first levels which were later differenced once to make them stationary, in addition the multicollinearity test indicated that there was no multicollinearity in the data set. In order to establish the relationship between exchange rate and the independent variables, a multiple linear regression model was fitted for the stationary variables and the results indicate that there was a negatively significant relationship between exchange rate and exports with P value (0.0485<0.05), and an insignificant relationship between exchange rates, inflation and interest rates with all their P values >0.05. Therefore, the government to stabilize exchange rates, specific policies should be put in place for example reduce on inflation rates through fiscal and monetary policies, increase interest rates so as to increase the value of the home currency and also promote exportation of Ugandan products through creating a favorable investment environment this increases the value of the shilling against foreign currencies on the world mark.*

Keywords: Determinants, Exchange Rates, Uganda

CHAPTER ONE: INTRODUCTION

Background of the study

Today, in line with a liberalized current and capital account of the balance of payments, Bank of Uganda pursues a flexible exchange rate policy regime. In this regime, the price of the shilling visa-vi the US dollar and other foreign currencies is determined by the market forces of demand and supply. Exchange rate fluctuation is seen as a general phenomenon and this has an adverse effect on trade. The rate of uncertainty of exchange rate has a negative effect on the level of international trade as bilateral trade is limited with the risks involved. The unwillingness of firms to take on risky activity is the economic relationship supporting the negative link. Exchange rate movements affect a nation's trading relationship with other nations. (Olugbenga & Ademola, 2011)

In the 1990s Uganda experienced a relative stabilization of the economy with inflation recorded at an annual rate of less than 10%. The improvement in the Ugandan economy is because of the national economic recovery programme and presence of political stability. The economic recovery programme focuses mainly on price, trade, exchange rate liberalization, restoration of fiscal discipline and adherence to a decidedly anti-inflationary monetary stance. The high and persistent inflation in the 1 980s was attributed to the major devaluations of the exchange rate in Uganda. Real GDP declined to negative levels; budget deficit was increasing at an annual rate of 23%. During this period the shortage of foreign exchange was very high thus becoming very difficult to obtain foreign exchange since foreign exchange dealings were withdrawn from commercial banks to the central bank hence development of a new parallel market known as (Kibanda).
This included price liberalization, devaluation, trade policy reforms and public enterprise and fiscal reform. The major aim of this programme was exchange rate adjustment since unpredictable macroeconomic policies over the past decade resulted into real exchange rate misalignment and deterioration of Uganda's external position. These stabilization efforts were successful in the short run. (Charles Mbire, 2022).

Problem statement

According to (MP Dooley, 2005) the ideal state of exchange rate can be achieved under a fixed exchange rate regime. The Ugandan Shillings is pegged to the United States dollar at a central rate shs 3,700 to 1 U.S. dollar. Pegging one currency to other currencies results into less fluctuation when trading between countries. This makes the currencies less influenced by market conditions than currencies with floating exchange rates and therefore making them stable. In line with a liberalized current and capital account of

the balance of payments, Bank of Uganda Pursues a flexible exchange rate policy regime which deviates from the fixed exchange rate policy of stable exchange rate. Through the quarter concluded December 2020, the Uganda Shilling stood at an average midrate of shs 3655.2618 per US Dollar, a depreciation of 0.38 per cent and 1.5 per cent on quarterly and annual basis, respectively. The latest depreciation of the Uganda Shilling is mainly driven by elevated dollar demand coming mainly from offshore players, oil, manufacturing and telecommunications sectors, coupled with short dollar position covering by some banks. In addition, the Nominal Effective Exchange Rate (NEER) further depreciated by 0.46 per cent and 2.76 per cent on quarterly and annual basis, respectively, during the quarter ended December 2020. The Real Effective Exchange Rate (REER), which considers the inflation differential between Uganda and its trading partners depreciated by 0.8 per cent on quarterly basis, during the quarter under review. Soon, the shilling is likely to remain stable in the short run, albeit with a bias towards depreciation. This is based on the high corporate dollar demand as economic activity picks up, as well as easy global financial market conditions (Bank of Uganda, 2020) .This study seeks to deviate from the norm and examine the combined effects of interest rates, exports and inflation on exchange rates. Therefore, due to the high volatility of the exchange rate in the country, the study seeks to examine the possible solutions that can help Uganda purse a stable exchange rate regime.

Objectives of the study.

Main objective.

To examine the determinants of exchange rate in Uganda.

Specific objectives

I. To examine the effect of Exports on Exchange Rate in Uganda for the period 2001-2020
II. To determine the effect of Interest Rates on Exchange Rate in Uganda between 2001-2020
III. To investigate the effect of Inflation on Exchange Rate in Uganda between 2001-2020

Scope of the study

In terms of geographical scope, the study will focus on the determinants of exchange rate in Uganda. It will focus on a period of 20 years 2001 to 2020

Content scope

The dependent variable for this study is real exchange rate and the independent variables are;
Interest rates, Inflation and Exports

Time scope

The study will focus on Uganda's exchange rate for a period of 20 years 2001-2020. This data will be got from Bank of Uganda and World Bank data

Contextual Scope

The liberalization of the exchange rate regime in Uganda has resulted in a very volatile exchange rate. This instability is determined by several factors which include inflation, interest rates, public debt, political instability, economic health, balance of trade, current account deficit and confidence however this study seeks to focus on the effect of interest rates, exports and inflation on the current exchange rate. This will be measured by examining the relationship between the independent variables (interest rates, exports and inflation) and the dependent variable (exchange rate).

Definitions of the Key terms

Exchange rate is the price of a nation's currency in terms of another currency. It is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in terms of another currency.

The nominal exchange rate is defined as the number of units of the domestic currency that can purchase a unit of a given foreign currency. A decrease in this variable is termed nominal appreciation of the currency while an increase in this variable is termed nominal depreciation of the currency.

The real exchange rate is defined as the ratio of the price level abroad and the domestic price level, where the foreign price level is converted into domestic currency units via the current nominal exchange rate.
Price of domestic good is,
RER=NER x price of domestic goods/price of foreign goods.

Where RER = Real Exchange Rate
NER = Nominal Exchange Rate
Interest Rates is the amount of interest due per period, as a proportion of the amount lent, deposited or borrowed (called the principal sum).

$$P=\frac{r(PV)}{1-(1+r)^{-n}}$$

P- Payment
PV- present value
R(r)-rate per period
N (n)-number of periods

Exports are a function of international trade whereby goods produced in one country are shipped to another country for future sale or simply means the sending of goods and services produced in one country to another country
GDP=C+G+I+NX
Where:
C = All private Consumption
G = All Government Spending
I = Investment by Businesses
NX The country's net exports (total exports — total imports)
Inflation is the rate at which the general level of prices for goods and services is rising and, consequently, the purchasing power of currency is falling

$$\text{Inflation Rate} = \frac{CPI_{2-CPI_1}}{CPI_1}$$

Where,
CpI_2 – the CPI in the second period
CPI_1 – the CPI in the first period.

Where CPI- consumer price index.

Forex market is a market in which participants can buy, sell, exchange and speculate on currencies.
Foreign exchange is the exchange of one currency for another or the conversion of one currency into another currency.
Global market is the activity of buying and selling goods in all countries of the world or the value of the goods and services sold.
US dollar is the most powerful currency in the world. It refers to a specific denomination and to the United States currency in general
Central Bank is a national bank that provides financial and banking services for its government and commercial banking system.

SECTION TWO: METHODOLOGY

Research Design

The study used involved the use of Quantitative Research approach. Quantitative methods of data collection were used to collected secondary data on the real effective exchange rate from Bank of Uganda for the period (2001-2020). The data collected was categorized into Quarters and then used to carry out data analysis and diagnostic checks.

Diagnostic tests

Heteroscedasticity test

A Breusch-pagan test shall be carried out by estimating the model by OLS assuming no heteroscedasticity to find out if there is a constant variance in the series using the regression equation.
The null hypothesis shall be rejected if p-value<significance level.

Multicollinearity test.

This refers to the existence of a perfect and not a perfect relationship between the explanatory variables in this case, inflation rate, interest rate and the exports and normally occurs when economic variables tend to move together. We shall find the R^2 by running a regression and compute the F using the equation below.

$$F_i = \frac{(R2x1...X3)/(k—2)}{1—R2x1...X3/(n—k+1)}$$

Where, K is the number of variables and n is the number of observations.
If the computed F- value is greater than F tabulated, it will be taken that a Xi for example inflation is collinear to exports and rate of interest.

Autocorrelation test

This is done using Durban Watson test used to measure the linear associations between adjacent residuals from a regression model.
Test hypotheses, Ho: no autocorrelation
Hi: there is auto correlation
An OLS shall be run and Durbin Watson will be computed using STATA and a significance level shall be chosen DW upper du and DW lower dl.

Testing for Stationarity

This occurs when it appears about the same on average irrespective of when it was observed. This shall be carried out using the Augmented Dickey fuller test. A statistic was generated to decide with the following hypothesis:
Ho: the series is not stationary
Hi: the series is stationary
If the Mackinnon P value for Z (t) < 0.05, reject Ho and conclude that the series are stationary. Hence this implies there is no trend in the series.

Data analysis (multivariate)

MS EXCEL will be used to capture data and then exported to STATA which will be used for analysis. Following the results from the diagnostic tests, a multiple linear regression model will be fitted to establish it's a cause-and-effect relationship basing on the model below,

$$Y=\beta_0+\beta_1x_1+\beta_2x_2+\beta_3x_3+\varepsilon_i$$

Where, y is the exchange rate in US $
X_1 is the exports in US $
X_2 is the interest rate
X_3 is the inflation rate

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SECTION THREE:DATA ANALYSIS, RESULTS AND DISCUSSION

Diagnostic tests

Heteroscedasticity test

Table 3.1 Regressing of variables

```
. regress reershsusd exptsvol000 ir inflation
```

Source	SS	df	MS	Number of obs	=	20
				F(3, 16)	=	3.28
Model	292.702422	3	97.5674741	Prob > F	=	0.0485
Residual	476.615567	16	29.7884729	R-squared	=	0.3805
				Adj R-squared	=	0.2643
Total	769.317989	19	40.4904205	Root MSE	=	5.4579

reershsusd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
exptsvol000	-.0293071	.0117411	-2.50	0.024	-.0541972	-.004417
ir	.3394709	.2550865	1.33	0.202	-.2012882	.88023
inflation	-.0557291	.2731489	-0.20	0.841	-.6347788	.5233206
_cons	104.0923	6.020848	17.29	0.000	91.32872	116.856

Source: Stata output 2022.

Table 3.2: regression of the squared residuals and the independent variables.

```
. reg e2 exptsvol000 ir inflation
```

Source	SS	df	MS	Number of obs	=	20
				F(3, 16)	=	0.00
Model	7.1054e-15	3	2.3685e-15	Prob > F	=	1.0000
Residual	36.4325747	16	2.27703592	R-squared	=	0.0000
				Adj R-squared	=	-0.1875
Total	36.4325747	19	1.91750393	Root MSE	=	1.509

e2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
exptsvol000	-3.20e-11	.0032462	-0.00	1.000	-.0068816	.0068816
ir	-1.95e-12	.0705258	-0.00	1.000	-.1495081	.1495081
inflation	1.79e-09	.0755197	0.00	1.000	-.1600946	.1600946
_cons	5.83e-09	1.664633	0.00	1.000	-3.528864	3.528864

.

F statistic is 0.00
P-value (Prob >F) IS 1.000 since the p-value 1.000>0.05, we accept the null hypothesis and conclude that there is a constant variance in the series. This therefore implies that there is no heteroscedasticity but rather homoscedasticity.

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Confirmation test for heteroscedasticity.

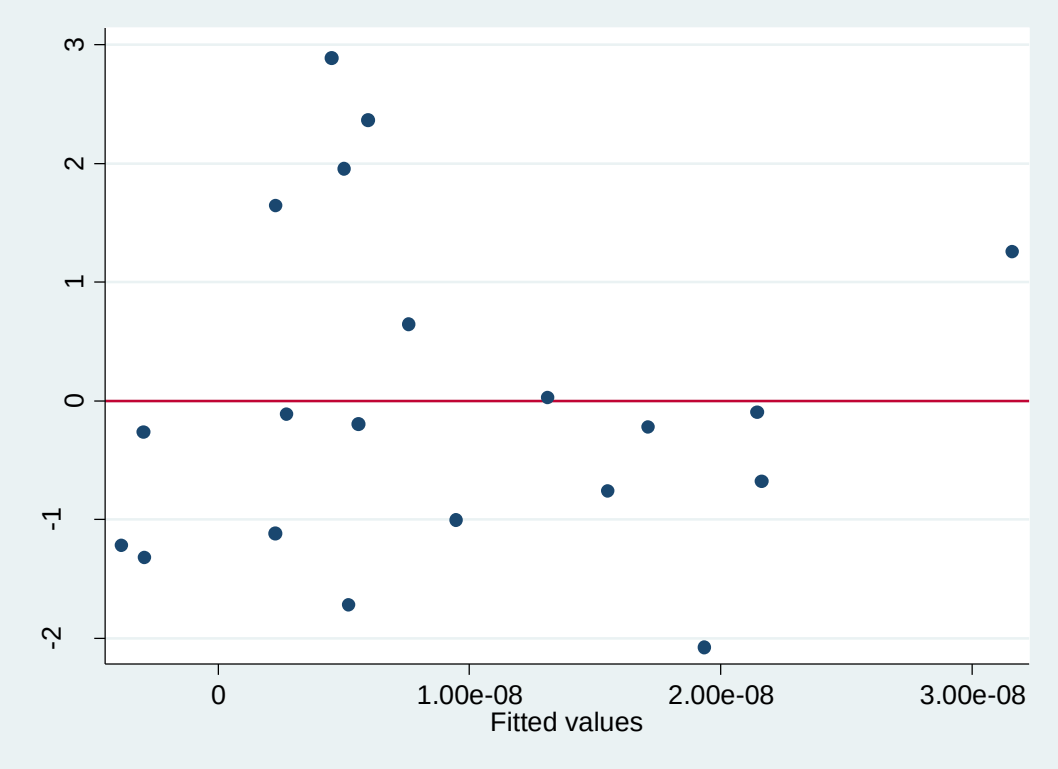
Table 3.3: the Breusch-pegan test

```
. hettest exptsvol000 ir inflation

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: exptsvol000 ir inflation

         chi2(3)      =     0.41
         Prob > chi2  =   0.9373
```

The chi-square test statistic is 0.41 with 3 degrees of freedom
The p-value is 0.9373 >0.05.therefore we accept the null hypothesis and conclude that there is constant variance which means that there is no heteroskedascity but rather there is homoscedasticity

Graphical representation of the finding

Figure 4.1. A scatter plot showing existence of heteroscedasticity.



Source: stata output(2022)
The graph above shows that there is no pattern in the data, this therefore proves that there is no heteroscedasticity in the series.

Multi collinearity test

Table. 4.4. Regression of the variables.

```
. regress reershsusd exptsvol000 ir inflation
```

Source	SS	df	MS	Number of obs	=	20
				F(3, 16)	=	3.28
Model	292.702422	3	97.5674741	Prob > F	=	0.0485
Residual	476.615567	16	29.7884729	R-squared	=	0.3805
				Adj R-squared	=	0.2643
Total	769.317989	19	40.4904205	Root MSE	=	5.4579

reershsusd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
exptsvol000	-.0293071	.0117411	-2.50	0.024	-.0541972	-.004417
ir	.3394709	.2550865	1.33	0.202	-.2012882	.88023
inflation	-.0557291	.2731489	-0.20	0.841	-.6347788	.5233206
_cons	104.0923	6.020848	17.29	0.000	91.32872	116.856

Source: Stata output (2022)
Prob>F =0.0485
The model is a good fit since the p-value (0.0485) is less than the critical value (0.05)
The coefficients of exports and interest rates are significant.

Testing for multi collinearity in the variables

Table: testing for multi collinearity using the correlation table

```
. pwcorr reershsusd exptsvol000 ir inflation
```

	reersh~d	expt~000	ir	inflat~n
reershsusd	1.0000			
exptsvol000	-0.5543	1.0000		
ir	0.3712	-0.1965	1.0000	
inflation	0.0101	-0.1394	-0.0739	1.0000

.

According to TC KREHBIEL (2004) the rule of thumb says that if the correlation coefficient of both dependent and independent variable is more than 0.8 then there is presence of multi collinearity, from the table above, we observe that the correlation coefficients for both dependent and independent variables are not more than 0.8. We therefore conclude that there is no multi collinearity.

Testing using the variance inflation factor

TABLE: 4.3.4Testing for multi collinearity using the variance inflation factor

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
  exptsvol000 |      1.07    0.937574
          ir |      1.05    0.950931
   inflation |      1.03    0.969888
-------------+----------------------
    Mean VIF |      1.05
```

The rule of thumb says that if the variance inflation factor (VIF) is more than 10 then we conclude by saying that there is presence of multi collinearity in the data. However, we observe that the variance inflation factor (VIF) is less than 10 for the individual coefficients. We therefore conclude that there is no multi collinearity.

4.433 auto correlation

4.6 a figure showing regression of the variables

```
. regress reershsusd exptsvol000 ir inflation

      Source |       SS           df       MS      Number of obs   =        20
-------------+----------------------------------   F(3, 16)        =      3.28
       Model |  292.702422         3  97.5674741   Prob > F        =    0.0485
    Residual |  476.615567        16  29.7884729   R-squared       =    0.3805
-------------+----------------------------------   Adj R-squared   =    0.2643
       Total |  769.317989        19  40.4904205   Root MSE        =    5.4579

------------------------------------------------------------------------------
   reershsusd |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
  exptsvol000 |  -.0293071   .0117411    -2.50   0.024    -.0541972    -.004417
           ir |   .3394709   .2550865     1.33   0.202    -.2012882     .88023
    inflation |  -.0557291   .2731489    -0.20   0.841    -.6347788    .5233206
        _cons |   104.0923   6.020848    17.29   0.000     91.32872     116.856
------------------------------------------------------------------------------
```

Source: Stata output (2022)

From the regression, residuals were predicted and generated in Stata using the command “predict e2, residuals”, from this the Durbin Watson test was done.

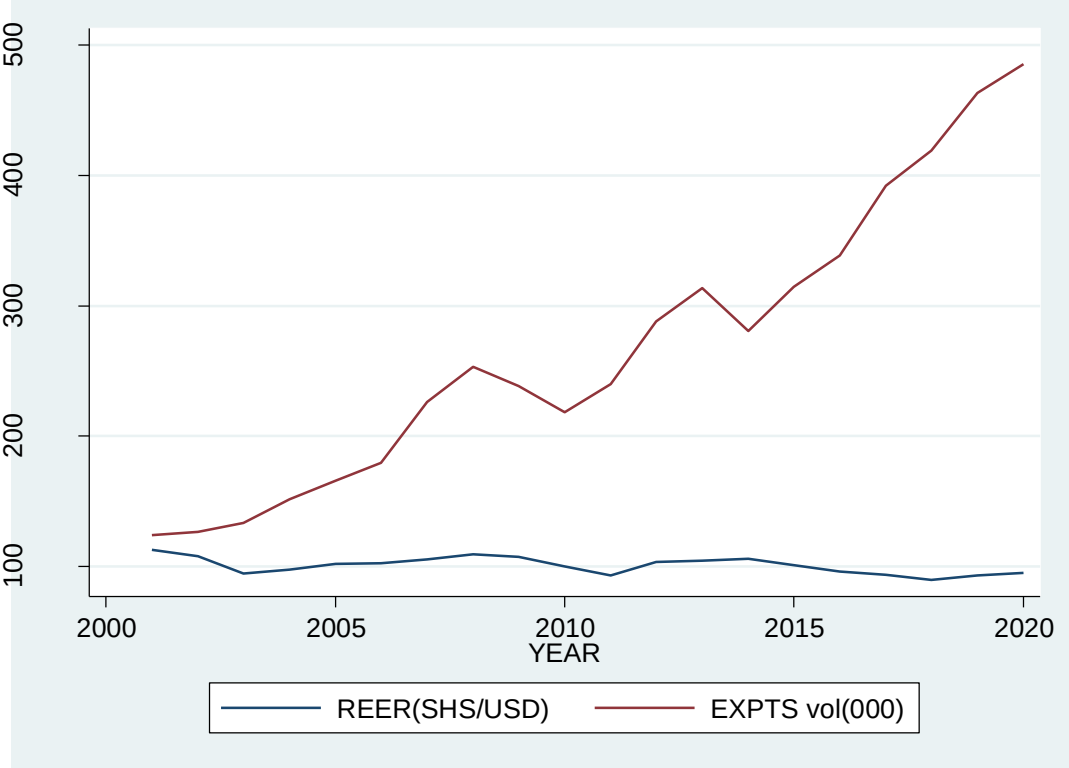
Durbin Watson test

Figure 4.55 computing the Durbin Watson (DW) test

```
. dwstat

Durbin-Watson d-statistic(  4,    20) =  1.052805
```

The rule of thumb says that if Durbin Watson (DW) statistic is greater than 2 then there is no evidence of autocorrelation in the residuals. But if DW is less than 2 then there is auto correlation .from the statistic above DW statistic (1.052805) < 2 therefore there is auto correlation.

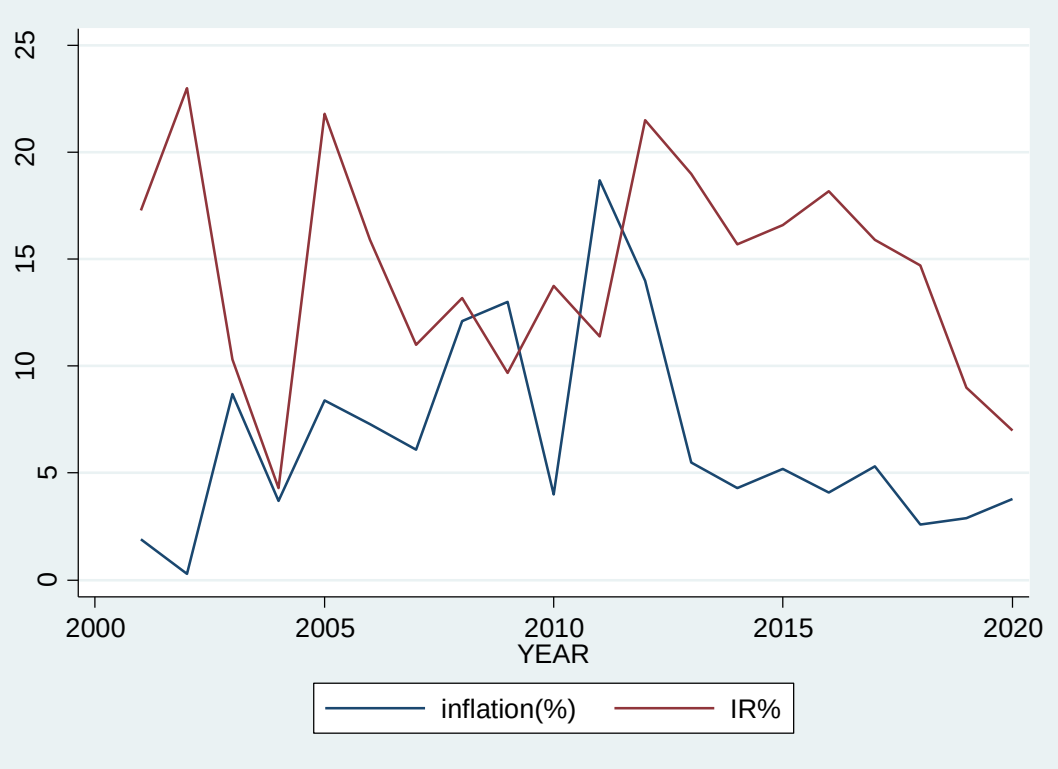
Testing for stationarity



Source: Stata output 2022

Exports are going up gradually from 2000 up to 2020 while the real effective exchange rate first decreased from 2000 to 2003, then went gradually constant with ups and downs from 2003 to 2020. This means that the data generating process does not around zero. This shows that data for (dependent variable) REER and independent variable (exports) is not stationary.

Graphical test for stationarity in variables interest rates and inflation.



Source: Stata output (2020).

From the figure above, we note that the data generating process is not stationary around zero but rather between 5 and 15. Therefore the independent variables interest rates and inflation require smoothening through the first differences so as to make the series perfectly stationary.

The Augumented Dickey-Fuller test for stationarity.

Table.4.787. The Augumented Dickey-Fuller for stationarity in the variable (REER)

```
. dfuller reershsusd, trend regress lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        18

                                 ------------ Interpolated Dickey-Fuller ------------
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -3.536            -4.380            -3.600            -3.240
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0357

------------------------------------------------------------------------------
D.reershsusd |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  reershsusd |
         L1. |  -.8319539   .2352947    -3.54   0.003    -1.336611   -.3272969
         LD. |   .4915629   .2207385     2.23   0.043     .018126    .9649999
      _trend |   -.409187   .2383584    -1.72   0.108    -.9204149    .1020408
       _cons |   87.67898   25.20697     3.48   0.004     33.61542    141.7425
------------------------------------------------------------------------------

.
```

Source: Stata output (2022)

The test statistic is -3.536 and its absolute value is lower than the two critical values at 1% and 5% and higher that the critical value at 10%. The p- value (0.0357) is lower than the critical value (0.05) therefore we reject the null hypothesis and this tells us that the series of independent variable (REER) is stationary.

The augmented dickey-fuller test for stationarity in the variable export volumes.

```
. dfuller exptsvol000, trend regress lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        18

                                 ------------ Interpolated Dickey-Fuller ------------
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -1.946            -4.380            -3.600            -3.240
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.6306

------------------------------------------------------------------------------
D.exptsv~000 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 exptsvol000 |
         L1. |  -.5105809   .2623922    -1.95   0.072    -1.073356    .0521943
         LD. |   .3803712   .2938028     1.29   0.216    -.2497732    1.010516
      _trend |   9.666832   4.508959     2.14   0.050    -.0039235    19.33759
       _cons |   45.85562   23.12049     1.98   0.067    -3.732905    95.44414
------------------------------------------------------------------------------
```

Source: Stata output (2022)

The test statistic is (-1.946) and its absolute value is lower than the three critical values. The p-value (0.6306) is greater than the critical value (0.05) therefore we cannot reject the null hypothesis. This shows that the variable export volume is not stationary.

Table 4.90. **The augmented dickey-fuller test for stationarity in the variable interest rates**

```
. dfuller ir,trend regress lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        18

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -3.701           -4.380            -3.600           -3.240
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0223

------------------------------------------------------------------------------
D.ir            |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------+-------------------------------------------------------------
ir              |
        L1.     |  -1.289542   .348395    -3.70   0.002    -2.036775   -.5423087
        LD.     |   .3574106   .2527496     1.41   0.179    -.1846833    .8995045
     _trend     |   .1046403   .2259806     0.46   0.650    -.3800399    .5893205
      _cons     |   17.15925   5.586833     3.07   0.008     5.176683    29.14181
------------------------------------------------------------------------------
```

Source: Stata output (2022)

The augmented dickey-fuller unit test on the interest rates series shows that it is stationary since the p-value (0.0223) is lower than the critical value (0.05).we note that the absolute value for the combined statistic (3.701) is lower than the 1% critical value 4.380.

Table. 4.11 The augmented dickey-fuller test for stationarity in the variable inflation.

```
. dfuller inflation, trend regress lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        18

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -2.587           -4.380            -3.600           -3.240
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.2858

------------------------------------------------------------------------------
D.inflation     |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------+-------------------------------------------------------------
inflation       |
        L1.     |  -.7447693   .2878662    -2.59   0.022    -1.362181   -.1273578
        LD.     |  -.1239551   .2366374    -0.52   0.609    -.6314917    .3835816
     _trend     |  -.3017252   .2061994    -1.46   0.165    -.7439789    .1405284
      _cons     |   8.591106   3.218159     2.67   0.018     1.688841    15.49337
------------------------------------------------------------------------------
```

Source: Stata output (2022)

The augmented dickey-fuller unit test on the inflation series shows that it is stationary since the p-value (0.2858) is less than the critical value (0.05). We further note that the absolute value for the combined test statistic (2.587) is lower than all the three critical values.

4.55 smoothening the series through the first differences to make them stationary. (REER and Exports)

```
. dfuller dreershsusd, trend regress lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        18

                                 ------------ Interpolated Dickey-Fuller ------------
                    Test         1% Critical       5% Critical      10% Critical
                 Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -3.665             -4.380            -3.600           -3.240
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0247

------------------------------------------------------------------------------
D.dreershs~d |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 dreershsusd |
         L1. |  -.8856893   .2416408    -3.67   0.003    -1.403957   -.3674213
         LD. |   .5074746   .2231962     2.27   0.039     .0287664    .9861828
      _trend |   -.349111   .2336322    -1.49   0.157    -.8502023    .1519803
       _cons |   92.90312   25.96843     3.58   0.003     37.20637    148.5999
------------------------------------------------------------------------------

. dfuller dexptsvol000,trend regress lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        18

                                 ------------ Interpolated Dickey-Fuller ------------
                    Test         1% Critical       5% Critical      10% Critical
                 Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -3.041             -4.380            -3.600           -3.240
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.1210

------------------------------------------------------------------------------
D.dexpts~000 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
dexptsvol000 |
         L1. |  -.8454331   .2780036    -3.04   0.009    -1.441692   -.2491747
         LD. |   .3257858   .2394154     1.36   0.195    -.1877092    .8392809
      _trend |   4.831003   2.871418     1.68   0.115    -1.327575    10.98958
       _cons |   181.4592   62.57526     2.90   0.012     47.24862    315.6698
------------------------------------------------------------------------------
```

Data analysis. (Multivariate)

Table 4.16. Regressing the data

```
. reg reershsusd exptsvol000 ir inflation
```

Source	SS	df	MS	Number of obs	=	20
				F(3, 16)	=	3.28
Model	292.702422	3	97.5674741	Prob > F	=	0.0485
Residual	476.615567	16	29.7884729	R-squared	=	0.3805
				Adj R-squared	=	0.2643
Total	769.317989	19	40.4904205	Root MSE	=	5.4579

reershsusd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
exptsvol000	-.0293071	.0117411	-2.50	0.024	-.0541972	-.004417
ir	.3394709	.2550865	1.33	0.202	-.2012882	.88023
inflation	-.0557291	.2731489	-0.20	0.841	-.6347788	.5233206
_cons	104.0923	6.020848	17.29	0.000	91.32872	116.856

Source: Stata output (2022)
From the equation $Y=\beta_0+ \beta_1\Delta x_1+ \beta_2 \Delta x_2 + \beta_3 \Delta x_3+\varepsilon_i$
The final equation is

$Y = 104.0923-0.0293071\ x_1+ 0.3394709\ x_2-0.0557291\ x_3+ \varepsilon_i$

EXPLANATION OF THE FINDINGS.

Goodness of fit.
The model has a good fit (prob>F=0.0485). This is because the P-value (0.0485) is less than the critical value (0.05). This therefore means that the overall independent variables used cause variation in the dependent variable.

The R- squared value.
The value of R-squared value is 0.3805 which implies that 38.1% of the variations in real effective exchange rate can be explained by exports, interest rates and inflation.

The coefficients.
The value of β_1 (export volumes) is -0.0293071 which lies between the interval -0.0541972 and -0.004417. Therefore, a unit increase in exports will lead to 0.0293071 decrease in real effective exchange rates keeping other factors constant. Therefore, there is a significantly negative relationship between real effective exchange rates and exports volumes at 95% significant level.

The value of β_2 (interest rates) is 0.3394709 which lies between the interval -0.2012882 and 0.88023 Therefore a unit increase in exports will lead to 0.3394709 increase in real effective exchange rates keeping other factors constant.

The value of β_3 (inflation) is -0.0557291 which lies between the interval -0.6347788 and 0.5233206 Therefore a unit increase in inflation will lead to 0.0557291 decrease in real effective exchange rates keeping other factors constant.

Probability values for each coefficient.
The p-value for export volumes is 0.024 which is less than the critical value (0.05). This implies that export volumes significantly predict the dependent variable real effective exchange rate

The p-value for interest rates is 0.202 which is greater than the critical value (0.05). This implies that interest rates do not significantly predict the dependent variable real effective exchange rate

The p-value for inflation is 0.841 which is greater than the critical value (0.05). This implies that inflation does not significantly predict the dependent variable real effective exchange rate

SECTION FOUR: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The study showed that exchange rates are highly volatile keep fluctuating depending on factors such as change in interest rates, change in inflation, change in export volumes and prices. Stable exchange rates can be achieved in Uganda if Interest rates remain stable, inflation reduces and there is an increase in volumes of quality goods exported to other countries. Therefore, the government should set up policies that can help stabilize exchange rates, improve on exports, lower the rate of inflation and provide favorable interest rates.

Recommendations

The government through the Central Bank should reduce the rate of Inflation in the country since lower inflation tends to increase the value of a currency in the long-run.

Long-term supply-side policies, to increase the value of the currency in the long run, the government needs to adopt supply-side policies in order to increase competitiveness and cut costs of production for example privatization.

The availability of credit should be increased for exporters and also small and medium enterprises. This will favor accelerated export growth in the economy

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APPENDIX.
Appendix 1

YEAR	REER(SHS/USD)	EXPTS vol(000)	IR%	Inflation (%)
2001	112.7	124.4	17.3	1.9
2002	107.9	126.4	23	0.3
2003	94.5	133.3	10.3	8.7
2004	97.9	151.4	4.3	3.7
2005	102.3	165.8	21.8	8.4
2006	102.4	179.56	15.9	7.3
2007	105.6	226.2	11	6.1
2008	109.2	253.3	13.2	12.1
2009	107.3	238.4	9.7	13
2010	100	218.6	13.76	4
2011	93.1	239.8	11.4	18.7
2012	103.6	288.2	21.5	14
2013	104.4	313.8	19	5.5
2014	106	280.9	15.7	4.3
2015	100.9	314.7	16.6	5.2
2016	96.1	338.8	18.2	4.1
2017	93.6	392.08	15.9	5.3
2018	90	419.3	14.7	2.6
2019	93.28	463.5	9	2.9
2020	95	485.6	7	3.8