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## RESEARCH ARTICLE

# ESTIMATING THE ERROR CORRECTION MODEL FOR SUDANESE EXCHANGE RATE

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**ABSTRACT**

Dynamic analysis is vital issue in econometrics, hence we were applied it to model and estimate exchange rate. The study suggested four variables in explaining exchange rate movement, these variables covers the proxies of fiscal, monetary , and mixed policy. Furthermore GDP is introduced to reflect the overall performance of the economy. Some variables were stationary while others were not. Cointegration tests confirmed the existence of long run equilibrium relationship between exchange rate and the explanatory variables, hence the model was estimated by error correction model. The estimated coefficient were in combatable with economic and econometric theories. Monetary policy coefficients in short and long run proved the existence of J curve effect. Despite the multiplier of monetary policy was larger than that one of fiscal policy, the later policy was more effective than the former one in manipulation exchange rate.

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## INTRODUCTION

Studying exchange rate requires appropriate approach in order to tackle all aspects that encompass it. Hence the dynamic analysis facilitates the managing of exchange rate moreover it explains factors that effect it. Dynamic econometrics provides smooth technique for dealing with relation overlapping long run equilibrium as well as short run. We resort to dynamic econometrics because classical one is unable to hold the relations that convey long run equilibrium on the steady state rate of the phenomena under study. The classical regression gives spurious results if the none stationary properties of the variables were not hold exactly. Accordingly the results draw from such regression will not help in drawing precise interpretation and consequently future forecast. Based on above justification we need to realize and test the stationary nature if the suggested model variables more over to inquire into whether there exist long run equilibrium relationship or not and consequently estimating the such relation via econometrics technique, namely, error correction model such technique can be justifiable when all variables or some of them were not stationary beside exiting long run equilibrium relationship.

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This study applying such dynamic method to selected model of exchange rate, which counts for factors that theoretically explain exchange rate significantly in addition to the impacts of fiscal monetary as well as mixed policy which introduce in the study via proxy variables. Finally the off springs of the suggested dynamic analysis pave the way for managing and orienting the domestic exchange rate, and Hence realizing the economic stability and development sustainability, this because exchange rate is the title of given economy and effectively responsible from business cycle in a world of interactive economic relations cause by massive international exchange.

### Stationary

Atime series is said to be weakly stationary or covariance stationary if its expected value and population variance are independent of time and if the population covariance between its values at time t and t+s depends on s but not on time (Baltagi, 2008). If the time series are nonstationary least squares estimators will be inconsistent and diagnostic statistics, such as t and f statistics will not have their standard limiting distribution. As consequence, with nonstationary time series, the regression coefficient of explanatory variable may apparently be significantly different from zero when in fact it is not a determinant of the dependent variable. A linear combination of two or more series will be nonstationary if one

or more of them is nonstationary, and the degree of integration of the combination will be equal to that of the most highly integrated individual series. Even if the series have means that not trending , a simple regression involving multi independent I(1) series will often result in a significant t statistic. Granger and New bold (1974) showed that even though $y_t$ and the set of $x_t$ are independent, the regression of $y_t$ on the set of $x_t$ yields statistically significant t statistic large percentage of time, much larger than the nominal significance level, this called spurious regression problem, whereas there is no sense in which y and the set of x are related, but OLS regression using the usual t statistics will often indicates a relationship. The possibility of spurious regression with I(1) variables is quite important and has led economists to reexamine many aggregate time series regressions whose statistics were very significant and whose R-squared were extremely high. The safe course to follow is differencing I(1) variables before they are used in linear regression models which is the approach used in many time series regressions after Granger and New bold work on the spurious regression problem, unfortunately, always differencing I(1) variable limits the scope of the questions that we can answer.

Time series are consistent with the theoretical and empirical properties of integrated data. In the limit, presidential approval, for example, cannot be integrated because its range is restricted to a unit interval and the series appears to cross some mean value with regularity. Similarly, the variance of the series is restricted and therefore is not strictly time dependent.6 Alternatively, the properties of unit root processes may be mimicked by alternative long memory (Box-Steffensmeier and Smith 1996, 1998) or borderline processes (De Boef and Granato 1997) and these alternatives must be entertained whenever unit root processes are considered. The latter arguments are particularly relevant given the low power of unit roottests. It has long been known that unit root tests have a low power against local alternatives (Evans and Savin 1984). Phillips (1987) developed local-to-unity asymptotic to formalize the logic in reference to local alternatives to unit roots. He called these local alternative processes near-integrated or near-I(1) processes. Phillips defined a near-integrated time series, as one for which the DGP has a root close to but not quite unity: If pretests for unit roots have a low power against near-integrated alternatives, we must consider the possibility that tests for cointegration and estimated cointegrated models are based on near-integrated data. In these cases, the relationship may be near-cointegrating. Like series with explosive autoregressive roots, trends, or stochastic roots (Granger and Swanson 1996), cointegration may characterize relationships between near-integrated time series. We define these near-cointegrating relationships in a matter analogous to Engle and Granger (1987).

**Cointegration & Near-Cointegration**

If exist parameters in an I(0) process with none zero means which indicate constant mean, constant variance and auto correlations that depend only on the time distance between any two variables in the series, and it is asymptotically uncorrelated. In such case we say that y and the set of x are cointegrated. The regression will spurious if the cointegration is not existed. The term cointegration was defined by Granger (1983) as a formulation of the phenomenon that nonstationary processes can have linear combinations that are stationary. It was his investigations of the relation between cointegration and error correction that brought modeling of vector autoregressions with unit roots and cointegration to the center of attentionin applied and theoretical econometrics. The first estimation method used in this model is least squares regression, Engle and Granger (1987), which is shown to give a super consistent estimator by Stock (1987). This estimation method gives rise to residual based tests for cointegration. It was shown by Phillips and Hansen (1990) that, for a more general error term, a modification of the regression estimatorgives useful methods for inference on coefficients of cointegration relations; see also Phillips (1991). Cointegration methodology is now commonly used in time series econometrics. Engle and Granger (1987) state that two or more series are cointegrated if each component series is integrated and some linear combination of these series is stationary. Prior to Engle and Granger's (1987) contribution, the standard procedure for making integrated data stationary was differencing. But this type of transformation removes anylong-run relationships in the data; differenced data reflect only short-run dynamics. If various data series share common trends or move together over time, these features are negated, and information is lost. This is not true when analysts use cointegration methods. Cointegration methods allow us to describe stationary equilibrium relationships between integrated series, preserving long-run information.

The popularity of cointegration methods, particularly error correction representations variously estimated, follows from other factors as well (Davidson et al., 1978; Banerjee et al., 1986; Hendry 1995). For one, cointegration methodology allows us to represent the data in a way that takes advantage of its theoretical properties. In particular, where it is argued (as above) that some variables "trend" together, cointegration methodology offers a close fit with theory. Further, Engle and Granger's two-step method matches intuition nicely with estimation and it is now widely used. The lack of parameter restrictions, the compatibility with theory, and the direct appeal of the Engle–Granger methodology make cointegration methodology an attractive alternative for political scientists analyzing the causes and consequences of political change. Cointegration analyses begin with pretests for unit roots in the individual series of interest, typically using some form of the Dickey–Fuller (1979) test. Briefly, the series in question is first-differenced and regressed on its own lagged levels. If the coefficient on laggedlevels is significantly different from zero, we reject the unit root null. If tests support theinference that the data are best characterized as I(1) processes, analysts typically adoptthe Engle and Granger (1987) two-step methodology. In the first step, analysts estimate acointegrating regression where levels of the dependent process are regressed on levels of Two or more series are near-cointegrated if each component series is near-I(1) and somelinear combination of these series is I(0). While asymptotically all linear combinations of near-integrated processes should be stationary, it is not clear that this will be true in finite samples. Our earlier work (De Boefand Granato 1997) demonstrates that many static regressions involving near-integrated datawill find

spurious relationships, similar to the unit root case. It is not clear, however, that cointegration methodology transfers in a similar fashion to near-integrated processes. There are several questions that need to be addressed before we can have confidence in inferencesbased on cointegration methodology as it has been applied in political science. Can tests distinguish cointegrating from near-cointegrating and non-cointegrating relationships? Which tests and critical values perform well? Which have acceptable power and size? Ultimately, what are the properties of estimates of near-cointegrating relationships?

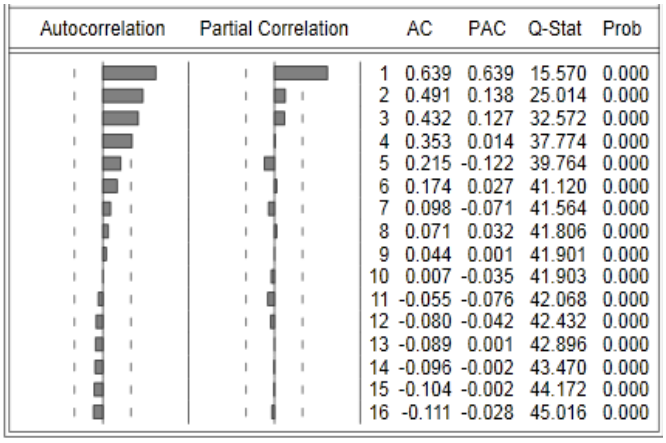
## Error Correction Model

In addition to learning about a potential long-run relationship between many series the concept of cointegration enriches the kinds of dynamic models at our disposal, this can be done through error correction model. In the case of a cointegration relationship, least squares estimators can be shown to be super consistent, in the sense that the parameter estimates approach their true value faster than they would in regression involving cross-section or stationary time series data (Stock, 1987). On its own a cointegration relationship sheds no light on short run dynamics, but its very existence indicates that there must be some short term forces responsible for keeping the relationship intact, and thus that it should be possible to construct a more comprehensive model that combines short run and long run dynamics, which is error correction model. The model states that the change in Y in any period will be governed by the change in X and the discrepancy between $Y_{t-1}$ and the value predicted by cointegration relationship. The later term denoted the error correction mechanism, the effect of the term being to reduce the discrepancy between $Y_t$ and its cointegrating level and its size being proportional to the discrepancy.

## Empirical Model

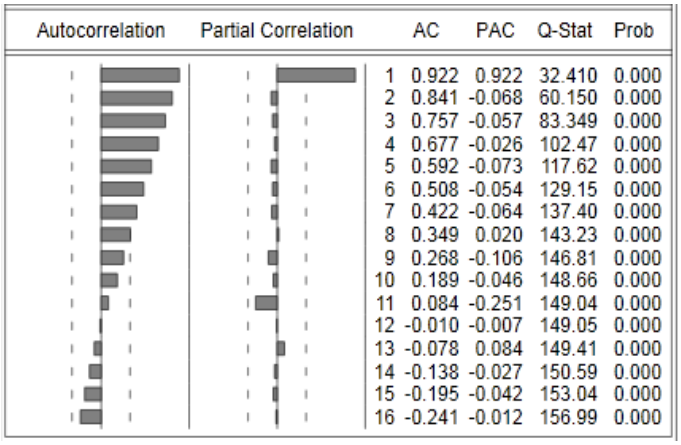
The model we need to estimate comprises from exchange rate as dependent variables while gooses domestic product, many supply as percentage from GDP government expedience as percentage from GDP, and interest rate respectively. GDP is incorporated to measure the impact of overall preference of the economy upon exchange role, here we expect to find positive impact because improvement in GDP will enhance exchange rate or will make it appreciated via increasing export. Money supply is introduce as proxy to monetary policy the detected sign of money supply will reveal how exchange rate can response to monitory policy either in short run or long run, according to the sign of money supply the implementation or none implementation of money supply can be recommended. Government expenditures introduced in the model as proxy to fiscal policy which is powerful tool of fiscal policy the detected sign of government expensive reveals the effectiveness or none effectiveness of this tool in stimulating the exchange rate, positive sign assured the effectiveness of government expenditure. The conflicted or reconcile sing of money supply and government expenditures show either the single use of them or the usage of two tools as one package (mix policy). Finally we incorporated in the model the interest rate which serves as mixed policy tools because it stimulate the fiscal policy via investment while at the same time money supply react to movement in exchange rate. Furthermore exchange rate connect positively to interest rate because increases in interest rate stimulate more inflow of capital which improve the position of payment balance and hence exchange rate appreciate. Accordingly the model aims to formulate short run and long run relationship between exchange rate and the set of suggested explanatory variables which called the equilibrium relationship in addition to adjustment mode which the model tend to it when the equilibrium is distorted.

**Exchange rate Correlogram**



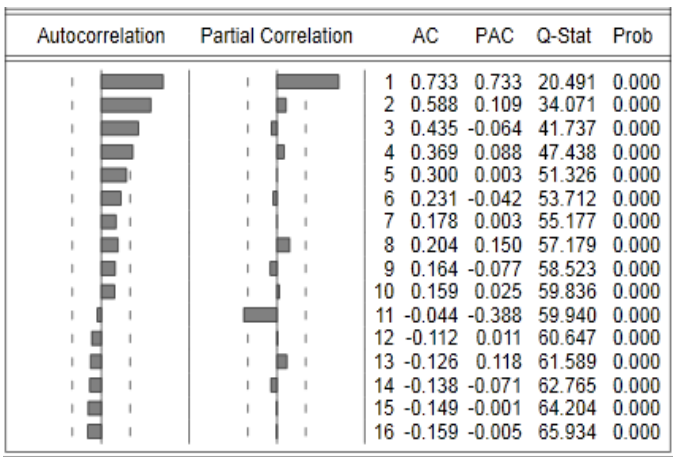
| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| | | 1 | 0.639 | 0.639 | 15.570 | 0.000 |
| | | 2 | 0.491 | 0.138 | 25.014 | 0.000 |
| | | 3 | 0.432 | 0.127 | 32.572 | 0.000 |
| | | 4 | 0.353 | 0.014 | 37.774 | 0.000 |
| | | 5 | 0.215 | -0.122 | 39.764 | 0.000 |
| | | 6 | 0.174 | 0.027 | 41.120 | 0.000 |
| | | 7 | 0.098 | -0.071 | 41.564 | 0.000 |
| | | 8 | 0.071 | 0.032 | 41.806 | 0.000 |
| | | 9 | 0.044 | 0.001 | 41.901 | 0.000 |
| | | 10 | 0.007 | -0.035 | 41.903 | 0.000 |
| | | 11 | -0.055 | -0.076 | 42.068 | 0.000 |
| | | 12 | -0.080 | -0.042 | 42.432 | 0.000 |
| | | 13 | -0.089 | 0.001 | 42.896 | 0.000 |
| | | 14 | -0.096 | -0.002 | 43.470 | 0.000 |
| | | 15 | -0.104 | -0.002 | 44.172 | 0.000 |
| | | 16 | -0.111 | -0.028 | 45.016 | 0.000 |

**Log of GDPCorrelogram**



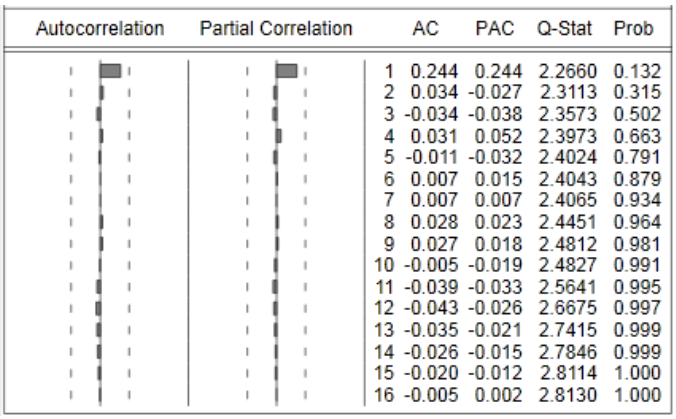
| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| | | 1 | 0.922 | 0.922 | 32.410 | 0.000 |
| | | 2 | 0.841 | -0.068 | 60.150 | 0.000 |
| | | 3 | 0.757 | -0.057 | 83.349 | 0.000 |
| | | 4 | 0.677 | -0.026 | 102.47 | 0.000 |
| | | 5 | 0.592 | -0.073 | 117.62 | 0.000 |
| | | 6 | 0.508 | -0.054 | 129.15 | 0.000 |
| | | 7 | 0.422 | -0.064 | 137.40 | 0.000 |
| | | 8 | 0.349 | 0.020 | 143.23 | 0.000 |
| | | 9 | 0.268 | -0.106 | 146.81 | 0.000 |
| | | 10 | 0.189 | -0.046 | 148.66 | 0.000 |
| | | 11 | 0.084 | -0.251 | 149.04 | 0.000 |
| | | 12 | -0.010 | -0.007 | 149.05 | 0.000 |
| | | 13 | -0.078 | 0.084 | 149.41 | 0.000 |
| | | 14 | -0.138 | -0.027 | 150.59 | 0.000 |
| | | 15 | -0.195 | -0.042 | 153.04 | 0.000 |
| | | 16 | -0.241 | -0.012 | 156.99 | 0.000 |

**Money supply as percentage of GDP Correlogram**



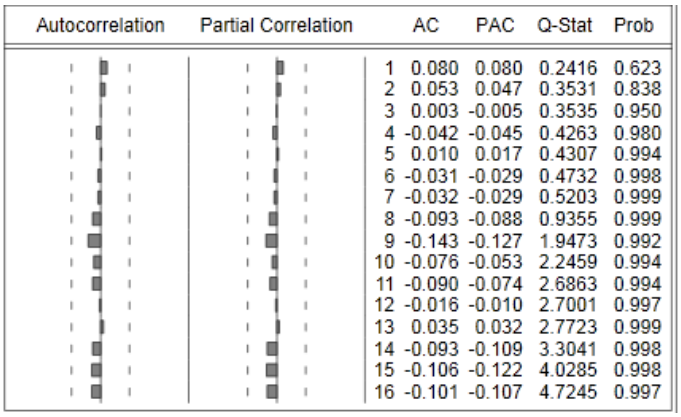
| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| | | 1 | 0.733 | 0.733 | 20.491 | 0.000 |
| | | 2 | 0.588 | 0.109 | 34.071 | 0.000 |
| | | 3 | 0.435 | -0.064 | 41.737 | 0.000 |
| | | 4 | 0.369 | 0.088 | 47.438 | 0.000 |
| | | 5 | 0.300 | 0.003 | 51.326 | 0.000 |
| | | 6 | 0.231 | -0.042 | 53.712 | 0.000 |
| | | 7 | 0.178 | 0.003 | 55.177 | 0.000 |
| | | 8 | 0.204 | 0.150 | 57.179 | 0.000 |
| | | 9 | 0.164 | -0.077 | 58.523 | 0.000 |
| | | 10 | 0.159 | 0.025 | 59.836 | 0.000 |
| | | 11 | -0.044 | -0.388 | 59.940 | 0.000 |
| | | 12 | -0.112 | 0.011 | 60.647 | 0.000 |
| | | 13 | -0.126 | 0.118 | 61.589 | 0.000 |
| | | 14 | -0.138 | -0.071 | 62.765 | 0.000 |
| | | 15 | -0.149 | -0.001 | 64.204 | 0.000 |
| | | 16 | -0.159 | -0.005 | 65.934 | 0.000 |

**Government expenditure as percentage of GDP Correlogram**



| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| | | 1 | 0.244 | 0.244 | 2.2660 | 0.132 |
| | | 2 | 0.034 | -0.027 | 2.3113 | 0.315 |
| | | 3 | -0.034 | -0.038 | 2.3573 | 0.502 |
| | | 4 | 0.031 | 0.052 | 2.3973 | 0.663 |
| | | 5 | -0.011 | -0.032 | 2.4024 | 0.791 |
| | | 6 | 0.007 | 0.015 | 2.4043 | 0.879 |
| | | 7 | 0.007 | 0.007 | 2.4065 | 0.934 |
| | | 8 | 0.028 | 0.023 | 2.4451 | 0.964 |
| | | 9 | 0.027 | 0.018 | 2.4812 | 0.981 |
| | | 10 | -0.005 | -0.019 | 2.4827 | 0.991 |
| | | 11 | -0.039 | -0.033 | 2.5641 | 0.995 |
| | | 12 | -0.043 | -0.026 | 2.6675 | 0.997 |
| | | 13 | -0.035 | -0.021 | 2.7415 | 0.999 |
| | | 14 | -0.026 | -0.015 | 2.7846 | 0.999 |
| | | 15 | -0.020 | -0.012 | 2.8114 | 1.000 |
| | | 16 | -0.005 | 0.002 | 2.8130 | 1.000 |

**Interest rate Correlogram**



| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| | | 1 | 0.080 | 0.080 | 0.2416 | 0.623 |
| | | 2 | 0.053 | 0.047 | 0.3531 | 0.838 |
| | | 3 | 0.003 | -0.005 | 0.3535 | 0.950 |
| | | 4 | -0.042 | -0.045 | 0.4263 | 0.980 |
| | | 5 | 0.010 | 0.017 | 0.4307 | 0.994 |
| | | 6 | -0.031 | -0.029 | 0.4732 | 0.998 |
| | | 7 | -0.032 | -0.029 | 0.5203 | 0.999 |
| | | 8 | -0.093 | -0.088 | 0.9355 | 0.999 |
| | | 9 | -0.143 | -0.127 | 1.9473 | 0.992 |
| | | 10 | -0.076 | -0.053 | 2.2459 | 0.994 |
| | | 11 | -0.090 | -0.074 | 2.6863 | 0.994 |
| | | 12 | -0.016 | -0.010 | 2.7001 | 0.997 |
| | | 13 | 0.035 | 0.032 | 2.7723 | 0.999 |
| | | 14 | -0.093 | -0.109 | 3.3041 | 0.998 |
| | | 15 | -0.106 | -0.122 | 4.0285 | 0.998 |
| | | 16 | -0.101 | -0.107 | 4.7245 | 0.997 |

**Augmented Dickey –Fuller unit root test**

| Variable | State of stationary |
|---|---|
| Exchange rate | Stationary in level |
| Log of GDP | Stationary in first difference |
| Percentage of money supply to GDP | Stationary in level |
| Percentage of government expenditure to GDP | Stationary in level |
| Interest rate | Stationary in level |

The scope of the study covers the period 1980 to 2014, this period witnessed the starting of currency devaluation at 1980, more over this period experienced many economic policies encountered to tackle the issue of foreign exchange sector and consequently the exchange rate. Such policies like fiscal, monetary and structural.

## DISCUSSION

In the step we test wither the variables of the study are stationary separately or not. According to Dicky Fuller augmented test one variable was not stationary in the level but stationery at the first difference which are gross domestic product .The rest of the variables are stationary at the level which are exchange rate, ratio of money supply to GDP, the ratio of government expenditure to GDP and interest rate. These results indicate that the classical OLS regression could produce spurious coefficients. Here we resort to test the existence of long run equilibrium relationship between the exchange rate and the rest of the variables. In Correlogram test two variables are stationary in the level which are government expenditure and interest rate, while the rest of the variables were none stationary in the level.

Equilibrium relationship test in the long run tackles by co integration tests namely Johansen and Juselius which are trace test and maximum eigen value test respectively. Unrestricted cointegration rank test (trace) indicated five co integration equations at the 5% level of confidence while unrestricted co integration Rank test (maximum eigen value) also reveals the existence of five co integration equations at 5% confidence level. The results of the tests indicate existence of long run equilibrium relationship between the exchange rate and the rest of explanatory variables GDP, money supply, government expedience and insert rate. Even if the variables separately were not stationary the combination of the series is stationary as whole. Hence the variables characterized by co integration relationship . accordingly the error correction model can be apply to estimate such relationship.

**Unrestricted Cointegration Rank Test**

| | Trace statistic | Prob. | Max Eigen statistic | Prob. |
|---|---|---|---|---|
| none | 163.96 | 0.000 | 84.25 | 0.000 |
| At most 1 | 79.71 | 0.000 | 33.37 | 0.008 |
| At most 2 | 46.34 | 0.000 | 23.29 | 0.025 |
| At most 3 | 23.05 | 0.003 | 14.64 | 0.045 |
| At most 4 | 8.41 | 0.004 | 8.41 | **0.004** |

**Error correction model**

| | Long run | | Short run | |
|---|---|---|---|---|
| variable | Co efficient | T value | Co efficient | T value |
| Exchange rate | | | 0.265907 | 3.18783 |
| Log of GDP | 0.010123 | 4.21076 | 0.044241 | 1.35038 |
| Percentage of money supply to GDP | 9405297- | -30.7865 | 4046018 | 2.28440 |
| Percentage of government expenditure to GDP | 7671.445 | 23.7002 | -3447.363 | -2.09500 |
| Interest rate | 0.085802 | 2.24325 | 0.017127 | 0.29483 |
| constant | -0.321139 | | -0.018694 | -1.07490 |
| Speed of adjustment | | | -0.429418 | -2.38419 |
| R squared | 0.509547 | | | |
| f- statistic | 4.502035 | | | |
| Akaike AIC | -2.237049 | | | |

The long run coefficients (lags) are positive and les elastic for domestic product and at the same time statistically significance. For money supply the coefficient is negative and elastic. For government expenditure is positive as well as elastic in addition to statistically significance, for interest the coefficient is positive and less elastic, lastly the constant term which count for spontaneously change in exchange is negative. The short run coefficients are positive and significance for first deference of exchange rate while less elastic for GDP is positive and less elastic as well as statistically significance. For money supply is positive in addition to fairly elastic and stationary significance while the sign of the coefficient is contradicted that one of long run. As far as government expenditure the coefficient is negative, fairly elastic and statistically significance which contradicted to long run coefficient. Insert rate coefficient is positive, less elastic as well as statistically significance which in accordance

with long run coefficient. The constant term is negative in short run. The coefficient which reflect the adjustment speed is negative, less than one and significant which matches the theory. Speed of adjustment coefficient value is(-0.429) which mean that if the long run relationship of equilibrium is deviated the system could maintain it after two years and half i.e. the average of trade cycle is approximately three years. The coefficients of determination is 0.51 which mean that the exploratory variables interpret 51% from the change of exchange rate in addition to F value is significance more over the Akaike information criterion is (-2.237049)

The above results indicate that the exchange rate responses to the explanatory variable in accordance with economic theory in the start run and long run for GDP and interest rate while its reaction to fiscal and monetary policy could differ from short run to long run. Constant term reveals depreciation in exchange rate in short run as well as long run. This is spontaneous change in exchange rate. The speed of adjustment is in accordance with econometric theory which indicate that the equilibrium relationship is maintained within approximately two years and half if it deviated.

## THE RESULTS

(1) One variable was not stationary at the level while stationary in the first level (GDP) while the rest ones were stationary in the level (exchange rate, money supply, and government expenditure and interest rate) this fact affirmed that the classical regression output was spurious.
(2) The co integration two test (Trace &maximum eigen value) indicate that the existence of long run equilibrium relationship. This result suggests the usage of error correction model estimation, which is suitable in such cases. Here short and long run coefficients can be detected.
(3) The spontaneous movement in exchange rate or change in exchange rate as result to internal factor shows negative trend this mean that exchange rate is automatically depreciate in shot run as well as long run at range between(-0.01 and -0.32) in short run and long run respectively. This result dictates decisive manipulation to exchange rate to opposite its trend.
(4) Gross domestics product effects exchange rate positively in short run as well as long run as confirmed by the sign of the coefficient. Exchange rate is less sensitive to GDP as the coefficient is less than one. This result is supported by economic theory which states positive role to GDP on exchange rate i.e. overall positive performance of the economy will improve the position of exchange rate.
(5) Money supply effects exchange rate positively in the short run while negative in the long run .This indicate that expansion in money supply improves exchange shortly while exchange rate depreciates in the long run . This result can attribute to J curve effect i.e. payment balance deficit will narrow firstly and consequently the deficit enlarge eventually. Hence the monetary policy is less effective in manipulation the exchange rate.
(6) As far as government expenditure which is proxy of fiscal policy it has negative effect on exchange rate in the short run and positive effect in the long run, this result justifies the usage of fiscal policy in manipulation exchange rate because the positive sign in the long run assures the relative effectiveness of fiscal policy with respect to monetary policy. Such relative effectiveness of fiscal policy may classify the state of economy is depressed one or even the economy suffers from recession.
(7) Interest rate effects exchange rate positively in the short run as well as long run and at the same time exchange rate is less sensitive to interest rate. This result combatable with economic theory i.e. in order to enhance the demotic currency interest rate must be raised. In addition interest rate instrument has low powerful magnitude in effecting exchange rate compare to government expenditure and money supply hence its usage is recommended to support government expenditure multiplier operation is preventing crowding out mechanism.
(8) Speed of adjustment coefficient of the model combatable with econometric theory which has the value of (-0.42). This value indicates that equilibrium can be maintained within two years and half if it deviates from it steady rate in addition the coefficient indicates that the trade cycle span in the economy has an average of three years approximately i.e. short run disturbances may not exceed three years after which the exchange rate return to its steady equilibrium rate.
(9) In short run exchange react to it self positively as indicated by the coefficient of exchange rate in first difference, which means that the stationary position of exchange rate results in consequent appreciation in it.
(10) The multiplier of monetary policy is greater than that one of fiscal policy as confirmed by the magnitude of the coefficients. Hence the increases in money supply make the situation worse off as compare rot the reduction of the government expenditure as result of opposite effect of two internments which stated by the sign of their coefficients.

**Concluding Remarks**

(1) Classical regression is not suitable for the study's model because it gives spurious results.
(2) The estimation of error correction model is straight forward for the model as it exists long run equilibrium relationship.
(3) The estimated coefficients were in accordance with the economic theory
(4) Disturbances in exchange rate can be properly manipulated by fiscal policy.
(5) The treacle cycle span of exchange rate is within the average of three years which combatable with classical trade cycle theories.

## REFERENCES

Ahn, S.K., Reinsel, G.C., 1990. Estimation for partially nonstationary multivariate autore-gressive models. Journal of the American Statistical Association 85,813.823.

Baltagi, Badi A. 2008. Econometrics, 4th edition, springer-verlag Berlin Heidelberg. pp. 355-367.

Banerjee, A., Dolado, J.J., Galbraith, J.W., Hendry, D.F., 1993. Co-integration Error-correction and the Econometric Analysis of Nonstationary data. Oxford University Press, Oxford.

Dickey, D.A., Fuller, W.A., 1981. Likelihood ratio statistics for autoregressive time serieswith a unit root. Econometrica 49,1057.1072.

Dougherty, Christopher 2002. Econometrics, second edition-oxford university press.pp 364-386.

Engle, R.F., Granger, C.W.J., 1987. Co-integration and error correction: Representation, estimation and testing. *Econometrica*., 55,251.276.

Engle, Robert F., and B. S. Yoo. 1991. *Cointegrated Economic Time Series: An Overview with New Results*. New York: Oxford University Press, pp. 237–266.

Hamilton, J.D., 1994. Time Series Analysis. Princeton University Press, Princeton NewJersey.

Harris R. 1995. Using cointegration analysis in econometric modelling, Prentice Hall.

Harvey A.C. 1990. The Econometric Analysis of Time Series, Phillip Allan, 2nd edition.

Hendry, D.F., 1995. Dynamic Econometrics. Oxford University Press, Oxford.

Johansen, S., 1996. Likelihood-based Inference in Cointegrated Vector Autoregressive Models. Oxford University Press, Oxford.

Johansen, S., Juselius, K., 1990. Maximum Likelihood Estimation and Inference on Cointegration. With Applications to the Demand for Money. Oxford Bulletin of Economicsand Statistics 52,169.210.

Pesaran, M.H., Schuermann, T., Weiner, S.M. 2004. Modeling regional interdepen-dencies using a global error-correcting macroeconometric model.

Wooldridge, Jeffrey M. 2006. Introductory econometrics (amodern approach), third addition, pp.639-653

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