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# Probability Forecast Using Fan Chart Analysis: A case of the Sierra Leone Economy

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# Probability Forecast Using Fan Chart Analysis: A case of the Sierra Leone Economy

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**Abstract**

*This article made use of ARIMAX methodology in producing probability forecast from Fan Chart analysis for the Sierra Leone economy. In view of the estimation technique used to determine best model choice for outputting the Fan Chart, the outcomes have shown the importance of Exchange Rate variable as an exogenous component in influencing Inflation dynamics in Sierra Leone. The use of Brier Score probability was also used to ascertain the accuracy of the forecast methodology. Despite inflation outcome is showing an upward trend for the forecasted periods, the probability bands (upper and lower) have also revealed the peculiarity of the Sierra Leone economy when it comes to addressing policy measures for controlling spiralling inflation dynamics.*

**Keywords**: *Inflation Forecast; ARIMAX; Fan Chart; Brier Score; Sierra Leone*
**JEL Classification**: *C32; C51; E27; E31; E37*

## 1. Introduction

The Sierra Leone economy is continuously being challenged by multiplicity of economic conditions which has gone for quite a long time; some of these are caused by internal macroeconomic / political economy problems, while at the same time, the influence of external factors are perpetually infiltrating into the fabrics of the economy on account of its high reliance on imported essentials or basic commodity goods and services to satisfy agents' needs. The economy has contend itself through heavy reliance on imported essential goods and services, which in effect have added pressure in terms of its non-resilience to external

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threats caused by shocks in global commodity prices. In a country like Sierra Leone and so too for many advanced economies, monetary policy decisions on rate fixing is mostly based on sound projections from Econometric model-based interpretations like Box-Jenkins ARIMA approach and as would be seen in this study, probabilistic outcome(s) using Fan Chart.
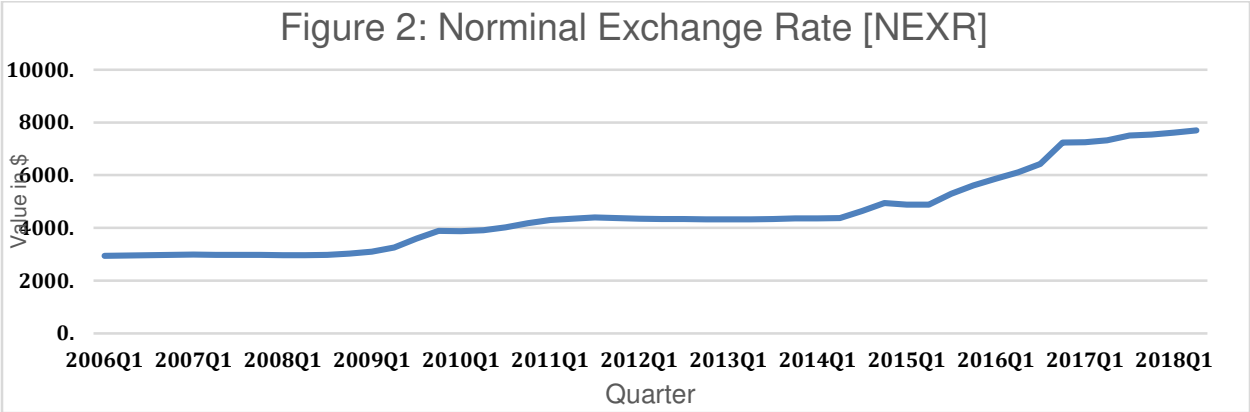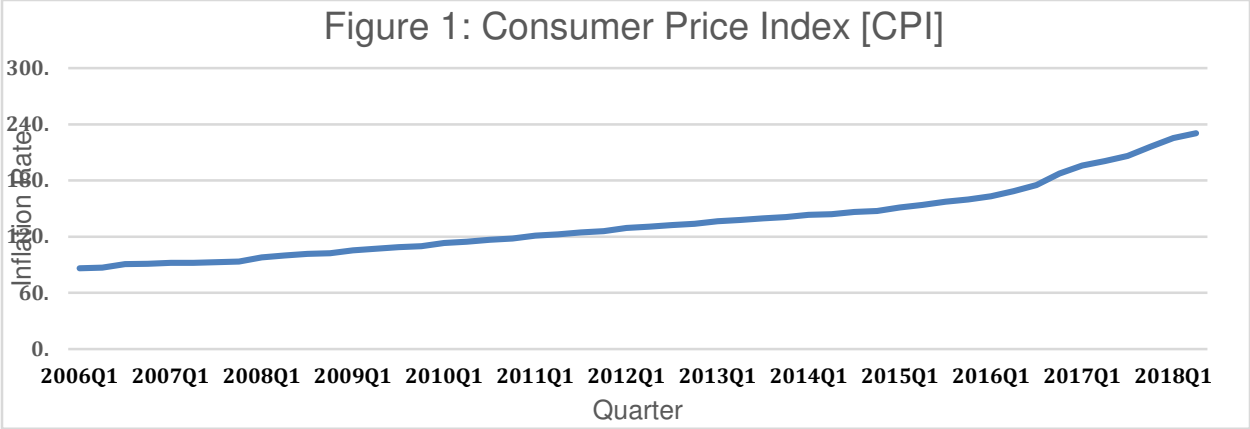
The failure of economic diversification can to a greater extent be blamed for pressures exerted on the economy, as the boom time in (mineral) resources exploration have not being judiciously utilised to ensure revenue received (from sales made) were plowed back into tangible investment opportunities for future generations. On the basis of this, the economy is continuously faced with the pressure of having to adjust itself to unanticipated impact of global price changes, which is and will continue to have a pass-through effect on the lives of economic agents, directly or indirectly.


2.  **Inflation Trend and other influences in Sierra Leone**

Inflation is a topical issue in Sierra Leone, even from as early as in the 1970s as outlined in a research by Kallon (1994: 201); this study manifested inflation rise of 11% (4.6%-15.33%), still a lower rate rise when compared to the rest of the world except Asian and the Industrialised-economy average, but in the 1980s, this galloped to almost a record rate of 63%, an average rise of 47.6% between 1974-79.  The situation continued to deteriorate on account of imbalances in global economic trend and more so the country's inability to self-sustain itself through diversified productive activities.

Figures 1 and 2 below shows Quarterly results for **CPI** and **NEXR** (pegged on the US$) variables in Sierra Leone from **2006Q1 to 2018Q2**. Based on the trend as shown in Figure 1, CPI (a composite of computed basket of goods and services consumed in the country) depict a continuous rise over the years, which is an attestation of the country's high reliant on the consumption of Market-led Tradable items, mostly dominated by imported goods and

services, which also intensify pressure on the stability of exchange rate given the high level of demand for US$ to address the country's inability in meeting (currency) supply needs.

### Figure 1: Consumer Price Index [CPI]



Figure 1: Consumer Price Index [CPI]

### Figure 2: Norminal Exchange Rate [NEXR]



Figure 2: Norminal Exchange Rate [NEXR]

Both Figures 1 and 2 depict a deterministic trend pattern, particularly in the case with CPI over the stated period of time. In the case with NEXR, the rise in exchange rate (NEXR) seem to be prominent from 2015 and beyond.

In view of the introduction and description of inflation dynamics in Sierra Leone as outlined in Sections 1 and 2, the paper is set out to address the following objectives:
- To produce a model that best suit an out-of-sample forecast using ARIMAX methodology.
- Calculate the Brier Score in determining the accuracy of forecast methodology for the selected periods.

The remaining parts of the paper will be divided into sections, incorporating a review of relevant literatures (Empirical and Theoretical) around the chosen methodologies, explanation of the two methodologies (ARIMAX and Brier Score), discussion of results from analysis and conclusion that focuses attention on relevant policy outcomes.

## 3. Theoretical and Empirical Review

### 3.1. Theoretical Review

This section addresses both theoretical and empirical practicalities of probability forecasting, more so covering areas pertaining to Time Series Econometrics and its combination with Fan Chart distribution of projected outcomes using confidence intervals. Probability forecast is quite popular in central bank research outputs, for example the Bank of England where it is commonly used to support MPC decisions relating to rate fixing and also eliciting trends on future inflation movements (BoE, Nov. 2017; Casillas-Olvera and Bessler, 2005).

The use of univariate Time Series analysis as produced by Box-Jenkins ARIMA methodology is quite popular and researchers are well convinced that tracking past events of the same variable normally helps in determining future outcome of events (Nosedal, 2016; Jackson et al, 2018 and Jackson. 2018). In a similar note, the use of external regressor (exogenous variable as the name imply) is equally useful in helping researchers make intuitive judgments about influences on outcomes for variables like inflation (Kravchuk, 2017).

In making futuristic decisions about outcome of events, researchers over the years have resorted to the use of ***Brier Score*** which gives a range of probabilities modelled on confidence intervals / bands for a normal Fan Chart (Brier, 1950; Gneiting and Ranjan, 2011). Despite its good feature of producing a range of probability forecast confidence bands, the Brier Score is equally fraught with criticism about the accuracy of forecast outcomes, particularly as witnessed in the case with weather forecast where judgments are based on intuition of the forecaster as opposed to true probability values (Jewson, 2008). Despite

criticisms levied, the use of calculated confidence bands using Brier Score is a very helpful tool for researchers when it comes to providing advice on policy-related outcomes as conclusion can rather be focused on a range of probabilities as opposed to being too prescriptive about a single utcome.

## 3.2. Empirical Review

There are myriad of empirical research tasks already produced to illustrate evidence of probability forecast in practice, some of which are critical, while others are straightforward in their approach. Taylor (2008) used ARIMA to forecast trends associated with intra-day arrivals by operators at a retail bank call centre study carried out in the UK. The study confirmed use of "*seasonal ARIMA and AR modelling, an extension of Holt-Winters exponential smoothing for the case of two seasonal cycles, a robust exponential smoothing based on exponentially weighted least absolute deviations regression and dynamic harmonic regression, also a form of unobserved component State Space Modelling.*

Equally, empirical research output conducted by Tamuke et al (2018) shows the relevance of ARIMAX over ARIMA methodologies in deciding on best forecast for central bank policy decision(s) in Sierra Leone. In as much as the study did not output range of forecast bands, it was seen as a starting point for providing some level of probability outcomes when using univariate variables like CPI and its regressor, which in this case is Exchange Rate in effecting policy stance at institutions like the Bank of Sierra Leone.

In a recent empirical study conducted by Perez-Mora et al (2018), there was an indication revealing relevance of ARIMAX modelling in forecasting Spanish Energy Market Prices using competitive variables. It was suggested that model development would be able to give realistic price value of energy consumption over a range of forecasted period.

Clements and Wallis performed calibration-based analyses on MPC 1-year-ahead inflation density forecasts in which they were both in agreement about the MPC's over-estimation of future uncertainty, which then made the inflation probabilistic forecasts "*Fan-out*" more rapidly than normal. In their views, it was perceived that the existence of bias raised some

doubts about the fact that the MPC would have placed too much emphasis on the upper ranges of the forecasted Fan Chart distribution. On a critical note, this might have been good to support effective policy actions to tighten the economy in the event of an unforeseen economic stress. Wallis (2004) also made efforts in comparing the MPC inflation forecasts with forecasts issued by the "National Institute of Economic and Social Research (NIESR)" to support their assertion of over forecasting, more on the upper band.

## 4. Methodologies for Analytical Outcomes

This is based on two approaches, the initial part of which involve the Box-Jenkins ARIMA(X) method using univariate CPI and backed with its exogenous component, which in this case is Exchange Rate, while the second is based on Probability approach of Fan Chart computation and interpretation.

### 4.1. Box-Jenkins Methodology

With reference to a study on ARIMA(X) conducted by Tamuke et al (2018), the use of a univariate methodology such as Box-Jenkins technique is greatly applauded as it provide a means through which a variable is able to track occurrences of itself over given period of time as illustrate below.

$Y_t = \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \phi_3 Y_{t-3} + ...+ \phi_p Y_{t-p} + e_t - \theta_1 e_{t-1} - \theta_2 e_{t-2}.....- \theta_p e_{t-p}$     [1]

Where, $Y_t$ is the original series, for every t, we assume that is independent of

$Y_{t-1}, Y_{t-2}, Y_{t-3}.................Y_{t-p}$ . In the aforementioned expression as expressed in equation 1, we made us of the Box-Jenkins Autoregressive Integrated Moving Average (ARIMA) model, a form of non-stationarity ARMA(p,q). With the incorporation of an external regressor (where d=1), this can now be written as indicated below:

$W_t = \phi_1 W_{t-1} + \phi_2 W_{t-2} ..... + \phi_p W_{t-p} + e_t - \theta_1 e_{t-1}....... - \theta_p e_{t-p} + \beta_1 X_{t-1} + ......+ \beta_r X_{t-r}$     [2]

Where X's are regressor variables and β's are the coefficients of regressor variable.

### 4.2. The Brier Score

In moving on with assurances about forecasting outcomes (where probability outcomes are to be considered for the benefit of effective policy prescription), the use of Brier Score probability confidence band can be applied. A Brier Core can be used to confirm the accuracy of a probability forecast; in this case, the specificity of an event, for example a 90% probability confidence indicating inflation rising or falling over the next 12 period in Sierra Leone. The Brier score is mostly useful for "*Binary Outcomes*" and in which cases, there are two possible events - "**Inflation falling**" or "**inflation rising**", or even applied to categorical outcomes, with the possibility of structures being set up as binary outcomes, and in this case, a "*true*" or "*false*" situation.

The probabilistic forecast of an event $k$s occurrence is denoted by $f$, while $o$ is a vector defined as the outcome of index for event $k$. In the event that $k$ occurs, $o$=1; While at the same time, if event $k$ does not occur, $k$ = 0. The Brier Score (BS) for a single forecast is here represented as: BS($f,o$) = $(f - o)^2$, $0 \leq 1$ 　　　　　　　　　　　　　　　　(1)

BS ranges between 0 and 1, where a score of 0 means that the forecaster predicted the event(s) perfectly. A forecaster who performed badly gets a 1. The mean probability score or Brier Score (BS) is an average of the single-forecast version of the probability score over N, occasions indexed by t = 1…….N:

$$BS = \frac{1}{N} \sum_{t=1}^{N} (f_t - o_t)^2$$

(2)

Here, the notation is the same as above. The Brier mean probability score can also be expressed for more than two-event cases.

## 5. Model Output Based on ARIMAX Methodology

The interpretation here is focused on the best model for ARIMAX methodology and followed by a production of Fan Chart distribution to illustrate possible probability outcome of future occurrences. Based on sub-section 5.1, three models have been outputted with the view of ensuring that a realistic outcome of Fan Chart is produced to support possible economic and

intuitive judgments about inflation dynamics in the Sierra Leone economy. In order to proceed, unit root tests were also performed on the variables to determine their stationarity level.

## 5.1.    The ARIMA[X] Model

### Table 1: Unit Root Test for Consumer Price Index [CPI]

Null Hypothesis: D(CPI4) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 3 (Automatic - based on SIC, maxlag=10)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -5.618935 | 0.0001 |
| Test critical values: | 1% level | -4.156734 |  |
|  | 5% level | -3.504330 |  |
|  | 10% level | -3.181826 |  |

*MacKinnon (1996) one-sided p-values.

### Table 2: The unit root test for Nominal Exchange rate [NEXR]

Null Hypothesis: D(NEXR) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -5.177871 | 0.0004 |
| Test critical values: | 1% level | -4.107947 | |
| | 5% level | -3.481595 | |
| | 10% level | -3.168695 | |

*MacKinnon (1996) one-sided p-values.

Tables 1 and 2 above provide an outline of Augmented Dickey Fuller [ADF] test for both CPI and NEXR variables. The diagnostic outcomes revealed that both variable have a unit root as low as 1% and also probability values showing their level of significance. This then made it possible to proceed with the model estimation as shown below in the three model outcomes to determine the most suitable model for producing the Fan Chart.

**Model Estimations**

**Table 3: Model 1**

Dependent Variable: D(CPI4)

Method: Two-Stage Least Squares

Date: 08/24/18   Time: 12:20

Sample (adjusted): 2005Q1 2018Q2

Included observations: 54 after adjustments

Convergence achieved after 51 iterations

MA Backcast: 2004Q3 2004Q4

Instrument specification: NEXR

Constant added to instrument list

Lagged dependent variable & regressors added to instrument list

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C | -15.42700 | 227.4104 | -0.067838 | 0.9462 |
| AR(1) | 1.278652 | 0.721479 | 1.772264 | 0.0826 |
| AR(2) | -0.272456 | 0.792665 | -0.343722 | 0.7325 |
| MA(1) | -0.905311 | 0.676679 | -1.337872 | 0.1871 |
| MA(2) | -0.063126 | 0.665945 | -0.094792 | 0.9249 |

| | | | |
|----------|----------|-------------------|----------|
| R-squared | 0.463466 | Mean dependent var | 2.789259 |
| Adjusted R-squared | 0.419667 | S.D. dependent var | 2.629857 |
| S.E. of regression | 2.003415 | Sum squared resid | 196.6699 |
| Durbin-Watson stat | 2.611774 | J-statistic | 5.72E-19 |
| Instrument rank | 5 | | |

| | | |
|---------------------|------|------|
| Inverted AR Roots | 1.01 | .27 |

**Estimated AR process is nonstationary**

| | | |
|---------------------|------|------|
| Inverted MA Roots | .97 | -.07 |

**Table 4: Model 2**

Dependent Variable: D(CPI4)

Method: Two-Stage Least Squares

Date: 08/24/18   Time: 12:21

Sample (adjusted): 2005Q2 2018Q2

Included observations: 53 after adjustments

Convergence not achieved after 500 iterations

MA Backcast: 2004Q3 2005Q1

Instrument specification: NEXR

Constant added to instrument list

Lagged dependent variable & regressors added to instrument list

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 2461.611 | 2432794. | 0.001012 | 0.9992 |
| AR(1) | 0.999942 | 0.057328 | 17.44255 | 0.0000 |
| MA(1) | -0.517767 | 0.172153 | -3.007596 | 0.0042 |
| MA(2) | -0.242119 | 0.169786 | -1.426025 | 0.1603 |
| MA(3) | -0.209978 | 0.182487 | -1.150648 | 0.2556 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.310541 | Mean dependent var | | 2.803774 |
| Adjusted R-squared | 0.269753 | S.D. dependent var | | 2.652840 |

| | | | |
|---|---|---|---|
| S.E. of regression | 1.931747 | Sum squared resid | 179.1190 |
| Durbin-Watson stat | 1.671456 | J-statistic | 5.555517 |
| Instrument rank | 6 | Prob(J-statistic) | 0.018423 |

| | | | |
|---|---|---|---|
| Inverted AR Roots | 1.00 | | |
| Inverted MA Roots | .99 | -.23-.40i | -.23+.40i |

**Table 5: Model 3**

Dependent Variable: D(CPI4)

Method: Two-Stage Least Squares

Date: 08/24/18   Time: 12:59

Sample (adjusted): 2006Q1 2018Q2

Included observations: 50 after adjustments

Convergence achieved after 16 iterations

MA Backcast: 2005Q3 2005Q4

Instrument specification: NEXR

Constant added to instrument list

Lagged dependent variable & regressors added to instrument list

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.340747 | 0.221342 | 1.539454 | 0.1305 |

|        |           |          |           |        |
|--------|-----------|----------|-----------|--------|
| AR(1)  | 0.858618  | 0.170009 | 5.050423  | 0.0000 |
| MA(1)  | -0.583845 | 0.158328 | -3.687566 | 0.0006 |
| MA(2)  | -0.388905 | 0.161858 | -2.402758 | 0.0204 |

| | | | |
|---|---|---|---|
| R-squared | 0.616640 | Mean dependent var | 0.084130 |
| Adjusted R-squared | 0.497508 | S.D. dependent var | 1.819446 |
| S.E. of regression | 1.629895 | Sum squared resid | 122.2017 |
| Durbin-Watson stat | 1.988303 | J-statistic | 1.468997 |
| Instrument rank | 5 | Prob(J-statistic) | 0.225504 |

| | | |
|---|---|---|
| Inverted AR Roots | .86 | |
| Inverted MA Roots | .78 | -.40 |

| Table 6: Summary of Model Outcomes | | |
|---|---|---|
| **Model No.** | **Model State [p,d,q]** | **ARMA Stability Condition** |
| Model 1 | 2,1,2 | Non-stationary AR process |
| Model 2 | 1,1,3 | Non-stationary AR process |
| Model 3 | 1,1,2 | Stationary ARMA process |

Based on the above outcomes as summarised in Table 6, it can be deduced that Model 3 (reference to Table 5) is considered the best choice for proceeding with the Fan Chart computation given its stationary condition for both the AR and MA processes [1,1,2] and

most importantly, a comparatively higher value for $R^2$ than the other two models. In addition, the Dubbin-Watson also shows that the errors are not autocorrelated, with a near value of 2. Model 1 and Model 2 (referenced in Tables 3 and 4) cannot be selected due to the fact that they are positively and negatively correlated respectively, with non-stationary AR roots.

## 5.2. Outputs from Fan Chart and Computation of Brier Score

### 5.2.1. Figure 3: Fan Chart
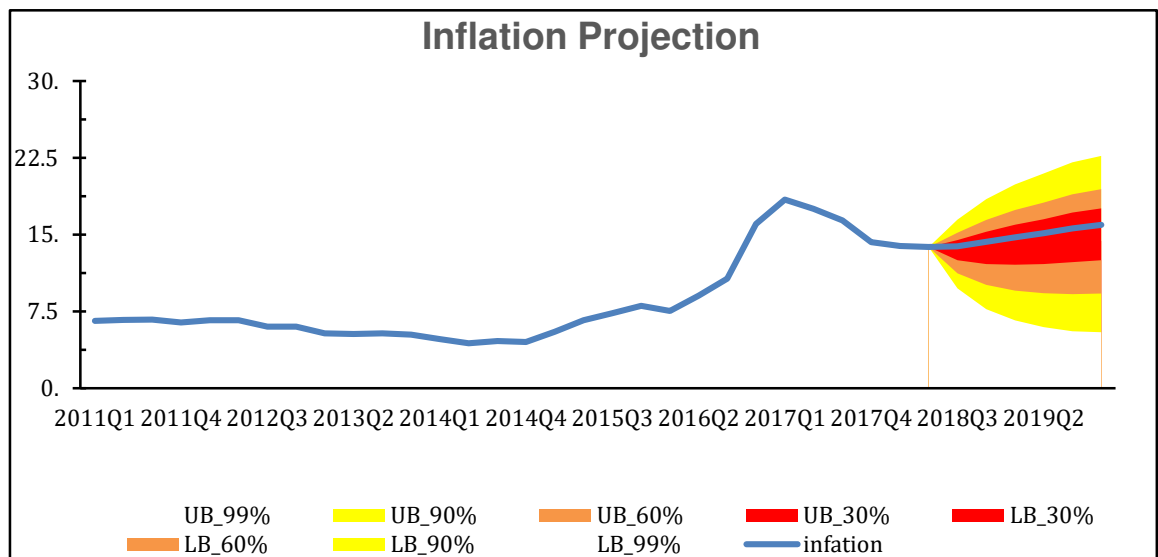


### 5.2.2. Table 7: Brier Score Computation Outcome

| UB_99% | UB_90% | UB_60% | UB_30% | LB_30% | LB_60% | LB_90% | LB_99% |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.673312 | 0.697777 | 0.719171 | 0.731619 | 0.017493 | 0.015613 | 0.012599 | 0.0095 |
| 0.626479 | 0.664494 | 0.69809 | 0.717783 | 0.017672 | 0.014697 | 0.010177 | 0.005963 |
| 0.595236 | 0.641235 | 0.682173 | 0.706286 | 0.01824 | 0.01454 | 0.009104 | 0.004377 |
| 0.573293 | 0.624359 | 0.67003 | 0.69702 | 0.018891 | 0.01467 | 0.008599 | 0.003567 |
| 0.552259 | 0.60748 | 0.657088 | 0.686494 | 0.01989 | 0.015152 | 0.008444 | 0.003094 |
| 0.540706 | 0.597785 | 0.649177 | 0.679687 | 0.020688 | 0.015654 | 0.008569 | 0.002995 |

### 5.2.3.

Based calculation from the formula

$$BS = \frac{1}{N} \sum_{t=1}^{N} (f_t - o_t)^2$$

BS = 0.3329

## 6. Discussion of Results

In view of the Fan Chart produced above in Figure 3, baseline inflation forecast for the given quarterly periods is 13.84% and gradually rising to 15.97% in 2019Q4. On a more constructive note, the lower confidence band of 90% seem to be pointing to the fact that inflation is likely to fall to a single digit mark in the year ahead as seen on the deviation from the baseline inflation line depicted by a blue mark. The upper 90% confidence band is also showing inflation likely to be moving above the 20% mark around the projected period of 2019Q4.

Economic interpretation cannot be solely relied upon to explain the reasons for such outcomes or deviation from the normal 13.95% to a close mark of near 16% during the end period of 2019 (reference to Appendix 1). While economic explanation around the concept of Demand and Supply and also monetary / fiscal conditions can be used to address the likely swing around the upper and lower bands on the Fan Chart, there is also the case of knowledge intuition around understanding of the economy to explain the situation of likely or unlikely outcomes from the chart.

Inflation dynamics in Sierra Leone is one of a serious concern, and more so lately after 2007, with pressure mounting on the exchange rate market, which has come as a result of high demand placed by importers on the Dollar currency and a correspondingly low supply of forex by the central bank to address the issue. In a nutshell, one cannot easily ascribe blame on the central bank for not meeting the demands of economic agents, as the reality of the situation can be attributed to the political economy state, which was made it very difficult for autonomy to be granted to the central bank in executing its authority to make effective use of its monetary and financial instruments.

In view of on-going legislative enactments and also policy measures placed by both government and the central bank, for example in the area of Exchange Rate auction and also activation of the Single Treasury Accounts held at the Bank of Sierra Leone, it is possible that

the lower 90% confidence band of the Fan Chart can be achieved with continuous monitoring of the situation. Moving ahead into the future, it is certainly the wish of the central bank authorities to ensure that a single digit inflation figure is achieved in the immediate future. Continued tightness of the state of monetary policy measures and more importantly, a revival of the country's real sector to increase productivity of essential commodities like basic staple food items, for example, rice will also witness a real swing of inflation to a near single digit figure.

Continued efforts by the agricultural sector to increase productivity of essential / basic staple food items during the harvest period (that may also account for surplus in the lean period) is also likely to influence prices to a low level point, while also witnessing its gradual fall in future periods. This means that unscrupulous market agents may unlikely be able to influence prices to rise given the fact that the forces of demand and supply will be at force in the economy without direct interference of authorities on market players / agents' efforts.

On the contrary side of things, the likelihood of the upper confidence band can be made possible in the event of unfavourable policy / measures and also shocks that is attributed to the vulnerability of the country's export commodities (e.g., Iron Ore and other essential agricultural exports) which are very prone to global price shock as dictated by strong / influential global market players. In this case, future policy direction to avert such vulnerability should seek to address localised intermediary industries that are geared towards transforming raw materials (eg., Iron Ore and Rutile) into intermediary products that will eventually bring about positive returns in the economy through job creations and many more.

Based on the calculation of the Brier Score [**BS = 0.3329**], which revealed a high degree of forecast accuracy [value ranging between 0 and 1], it is evident that the procedure used to arrive at the calculation is quite robust. In short, the closer the value to Zero, the higher the likelihood of the forecast being considered accurate, though the peculiarity of the economy in question can be used to address variations in outcomes from forecast; this is one of the downside of the Brier Score as revealed by Jewson (2008). In a country like Sierra Leone

where shocks in the global market can easily influence outcomes of price direction, computation of a Brier Score closer to the value 1 cannot necessary be judged as being non-robust, where effective policy measures to address situations of external influence on the economy can be made effective to avert higher level price swing.

7. **Conclusion**

The paper has provided an empirical outcome on the use of ARIMAX methodology in particular to produce a Fan Chart with six quarterly forecast from 2018Q3 to 2019Q4. The forecast shows a trending-up figure of inflation from 13.84% in 2018Q3 to a higher double-digit figure of 15.97% in 2019Q4 [Reference to Appendix 1). On a more confidence note, the Brier Score (BS) which is given as 0.339 is a real attestation of the accuracy of the inflation forecast process / methodology used.

On a realistic note, the inflation forecast value which is based on historical data for CPI and NEXR have been shown to produce signs of downward upward trends based on the given (lower and upper) confidence bands as revealed from the Fan Chart shown in Figure 3. The possibility of inflation continuing to rise can only be made possible where weak policy measures are set in place and also, the uncontrollable state of external shocks as witnessed during the crisis time of Ebola.

Based on prudent steps taken by management at the Bank of Sierra Leone, in support of the IMF for the return of FX auction in the wake of an overvalued exchange rate of the Leone currency as against the Dollar, the exchange rate seem to have taken a downward trend. The real question or doubt on this is to do with the length of time this prudent action will last for in terms of influencing market players / agents about the speculation of the bank's huge deposit of foreign reserves to cushion market signals of problems "Foreign Exchange (FX) market.

Despite the upward forecast trend produced, it is likely that a tightening up of relevant policy measures will likely make it possible for inflation in the future to fall, if not to as near a single

digit / figure. In the immediate future, and particularly so as witnessed for 2018Q3, (13.84%) it is possible that inflation may come to a single digit point given the speculation surrounding BSL's firm policy measure(s) in normalising price stability through FX mechanism.

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**Appendix 1: Inflation forecast for the period 2018Q2 to 2019Q4**

| QUARTERS | INFLATION Projection |
|---|---|
| QUARTER (3) 2018 | 13.84 |
| QUARTER (4) 2018 | 14.28 |
| QUARTER (1) 2019 | 14.73 |
| QUARTER (2) 2019 | 15.13 |
| QUARTER (3) 2019 | 15.62 |
| QUARTER (4) 2019 | 15.97 |

**Disclaimer**: The views expressed in this article are those of the authors and do not in anyway reflect that of the Bank of Sierra Leone.