Data Article

Datasets for correlation dynamics of cocoa production in South Western Nigeria

S.O. Edeki a,*, M.E. Adeosun b, G.O. Akinlabi a, O.M. Ofuyatan c

a Department of Mathematics, Covenant University, Ota, Nigeria
b Department of Mathematics & Statistics, Osun State College of Technology, Esa-Oke, Nigeria
c Department of Civil Engineering, Covenant University, Ota, Nigeria

ARTICLE INFO

Article history:
Received 17 December 2017
Received in revised form
3 March 2018
Accepted 16 March 2018
Available online 22 March 2018

Keywords:
Cocoa product
Correlation dynamics
Nigeria-economy

ABSTRACT

In the Nigeria economy, cocoa production has been of great importance. This buttresses the fact that cocoa as a product is the leading agricultural export of Nigeria, leaving the country currently as the world fourth largest producer of cocoa, after Ivory Coast, Indonesia and Ghana and the third largest exporter, after Ivory Coast and Ghana. Hence, there is need for the agricultural sector expansion, effective predictive models and reliable price mechanism. This article examines tonnes of cocoa production dataset of the Nigeria agricultural sector for the period of twenty-four (24) years spanning between 1993 to 2016. The Correlation dynamics examined includes the autocorrelation features as affected by the production rate within the considered time interval. The degree of similarity between the dataset and the corresponding lagged version of itself over successive time interval is measured using a serial correlation test while the results mostly favour negative correlation showing that large current values correspond to small values at the specified lag. These dataset can effectively serve as good candidate for agricultural product modelling in terms of forecasting.

© 2018 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

* Corresponding author.
E-mail address: soedeki@yahoo.com (S.O. Edeki).

https://doi.org/10.1016/j.dib.2018.03.076
2352-3409/© 2018 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).
Specifications Table

Subject area Agricultural Sciences
More specific subject area Cocoa production
Type of data Table, Excel file, graph.
How data was acquired Direct contact via statistical bulletin
Data format Analysed, CSV comma delimited.
Experimental factors Performance of correlation dynamics in relation to Nigeria agricultural sector with effect on cocoa production
Experimental features Serial correlation test and the degree of correlation
Data source location Statistical bulletin, Nigeria
Data accessibility Within this data article.

Value of the data

- The present data will be of great usefulness for the determinants of cocoa production in Nigeria.
- The dataset will help to know the trend and pattern of cocoa production output over the time.
- The dataset can be used for agricultural product modelling and forecasting.
- The dataset will aid in budget planning since cocoa production contributes immensely to the country's economy.

1. Data

The datasets used in this work contains tonnes of cocoa production of the Nigeria agricultural sector for the period of twenty-four (24) years. This is presented in Table 1 followed by Fig. 1. Related literature on cocoa production and Nigerian economy includes the references in [1–5]. Predictive and forecasting approaches are of great importance in any production sector [6]. In addition to the mathematical formula (1), the data are processed/analysed via the statistical software (SPSS).

Fig. 1 shows a graphical view of disease infested cocoa pods (Right), and non-infested cocoa pods (left). The healthy nature of cocoa trees have significant effect on the production of cocoa beans.

Table 1
Data on Cocoa Production in Tonnes (CPT).

| S/N | Years | CPT  | S/N | Years | CPT  |
|-----|-------|------|-----|-------|------|
| 1   | 1993  | 129.46 | 13  | 2005  | 194.13 |
| 2   | 1994  | 187.09 | 14  | 2006  | 122.14 |
| 3   | 1995  | 139.68 | 15  | 2007  | 111.09 |
| 4   | 1996  | 100.00 | 16  | 2008  | 172.35 |
| 5   | 1997  | 172.00 | 17  | 2009  | 168.00 |
| 6   | 1998  | 159.10 | 18  | 2010  | 167.79 |
| 7   | 1999  | 208.65 | 19  | 2011  | 188.07 |
| 8   | 2000  | 116.79 | 20  | 2012  | 123.08 |
| 9   | 2001  | 131.10 | 21  | 2013  | 120.33 |
| 10  | 2002  | 125.98 | 22  | 2014  | 132.50 |
| 11  | 2003  | 112.50 | 23  | 2015  | 144.80 |
| 12  | 2004  | 134.17 | 24  | 2016  | 112.80 |
2. Experimental design, materials and methods

2.1. Design, and methodology

In addition to the statistical software used in the data analysis, is the mathematical model defined as follows:

\[ r_1 = \frac{\sum_{y=1}^{N-1} (X_y - \bar{X}_1^n)(X_{y+1} - \bar{X}_2^n)}{\sqrt{\sum_{y=1}^{N-1} (X_y - \bar{X}_1^n)^2} \cdot \sqrt{\sum_{y=1}^{N-1} (X_y - \bar{X}_2^n)^2}} \]  

(1)

where \( \bar{X}_1^n \) and \( \bar{X}_2^n \) are the means of the first \( N-1 \) and the last \( N-1 \) observations respectively.

Eq. (1) represents the correlation coefficient computed between one time series and the same series lagged by one or more time units. Such correlation model is a good candidate for examining the relationship existing between adjusted volatilities in the market and the investment settings [7–10].

2.2. Data analysis

Here, the outcomes of the analysed data are presented in Tables 2–5, and Figs. 2 and 3. ACF and PACF in this regard denote Autocorrelation Function and Partial Autocorrelation Function respectively.
Table 3
Summary of case processing.

| Year | Tonnes of cocoa produced |
|------|--------------------------|
|      |                          |
| Series Length | 24 | 24 |
| Number of Missing Values | User-Missing | 0 | 0 |
| | System-Missing | 0 | 0 |
| Number of Valid Values | 24 | 24 |
| Number of Computable First Lags | 23 | 23 |

Table 4
Series: Tonnes of cocoa produced.

| Lag | Autocorrelation | Std. Error$^a$ | Box-Ljung Statistic |
|-----|-----------------|----------------|---------------------|
|     | Value | Df | Sig.$^b$ |
| 1   | −0.021 | .192 | .012 | 1 | .911 |
| 2   | −0.214 | .188 | 1.311 | 2 | .519 |
| 3   | −0.076 | .183 | 1.482 | 3 | .686 |
| 4   | −0.110 | .179 | 1.858 | 4 | .762 |
| 5   | −0.066 | .174 | 2.001 | 5 | .849 |
| 6   | .129 | .170 | 2.578 | 6 | .860 |
| 7   | −0.072 | .165 | 2.767 | 7 | .906 |
| 8   | −0.258 | .160 | 5.365 | 8 | .718 |
| 9   | −0.136 | .155 | 6.140 | 9 | .726 |
| 10  | .123 | .150 | 6.810 | 10 | .743 |
| 11  | .224 | .144 | 9.220 | 11 | .602 |
| 12  | .114 | .139 | 9.892 | 12 | .625 |
| 13  | −0.023 | .133 | 9.921 | 13 | .700 |
| 14  | .035 | .127 | 9.998 | 14 | .762 |
| 15  | −0.130 | .120 | 11.174 | 15 | .740 |
| 16  | .066 | .113 | 11.514 | 16 | .777 |

$^a$ The underlying process assumed is independence (white noise).
$^b$ Based on the asymptotic chi-square approximation.

Table 5
Partial Autocorrelations Tonnes of cocoa produced.

| Lag | Partial autocorrelation | Std. error |
|-----|-------------------------|------------|
| 1 | −0.021 | .204 |
| 2 | −0.215 | .204 |
| 3 | −0.090 | .204 |
| 4 | −0.171 | .204 |
| 5 | −0.127 | .204 |
| 6 | .048 | .204 |
| 7 | −0.145 | .204 |
| 8 | −0.300 | .204 |
| 9 | −0.302 | .204 |
| 10 | −0.122 | .204 |
| 11 | .029 | .204 |
| 12 | −0.016 | .204 |
| 13 | −0.071 | .204 |
| 14 | .089 | .204 |
| 15 | −0.105 | .204 |
| 16 | .030 | .204 |
2.3. Analysis overview

From the analysis, making reference to ACF in Fig. 2, it is pointed out that all the 16 coefficients are below the two-sided error limits. Only 6 out of the 16 are above the zero bar. From Fig. 3, the PACF shows that 12 out of the 16 coefficients are below the zero bar. Hence, there is a greater need to improve the trend model with regard to cocoa production in Nigeria. The ACF plot indicates significant autocorrelation and that the data are not stationary. Since stationary conveys the idea of the mean and standard deviation holding still and not shifting. The plot shows that the differenced data appear to be stationary and do not exhibit seasonality. Though, using regular differencing, the seeming trends can be adjusted by computing the difference between every two successive values.

Fig. 2. ACF plot for tonnes of cocoa produced.

Fig. 3. Partial ACF plot for tonnes of cocoa produced.
Acknowledgements

The authors are indeed grateful to Covenant University for the provision of resources, and enabling working environment.

Transparency document. Supporting information

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.dib.2018.03.076.

References

[1] K. Janek, et al., Dataset of cocoa aspartic protease cleavage sites, Data Brief 8 (2016) 700–708.
[2] M.E. Egharevba, et al., Microfinance and poverty reduction strategy for promoting national development: the challenge of social/financial inclusion, Soc. Sci. 11 (22) (2016) 5373–5386.
[3] F.C. Chidozie, O.I. Peter, O.O. Akande, Foreign megastores and the Nigerian economy: a study of shoprite, Mediterr. J. Soc. Sci. 5 (1) (2014) 425–437.
[4] J.F. Nwachukwu, Dynamics of agricultural exports in sub-sahara Africa: an empirical study of rubber and cocoa from Nigeria, Int. J. Food Agric. Econ. 2 (3) (2014) 91–104.
[5] W.O. Fawole, M.A.Y. Rahji, Determinants of productivity among farmers in Ondo State of Nigeria, AJAEES 9 (4) (2016) 1–7 (Article no. AJAEES.23167).
[6] O.M. Ofuyatan, S.O. Edeki, Dataset on predictive compressive strength model for self-compacting concrete, Data Brief 17 (2018) 801–806.
[7] S.O. Edeki, et al., Parameter estimation of local volatility in currency option valuation, Int. Rev. Model. Simulations 9 (2) (2016) 130–133.
[8] S.O. Edeki, E.A. Owoloko, O.O. Ugbebor, The modified Black-Scholes model via constant elasticity of variance for stock options valuation, AIP Conf. Proc. 1705 (2016) 4940289.
[9] J. Pospíšil, T. Sobotka, Test datasets for calibration of stochastic and fractional stochastic volatility models, Data Brief. 8 (2016) 628–630.
[10] S.O. Edeki, O.O. Ugbebor, E.A. Owoloko, On a dividend-paying stock options pricing model (SOPM) using constant elasticity of variance stochastic dynamics, Int. J. Pure Appl. Math. 106 (4) (2016) 1029–1036.