A news-based economic policy uncertainty index for Nigeria

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A NEWS-BASED ECONOMIC POLICY UNCERTAINTY INDEX FOR NIGERIA

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Abstract

In this study, we develop the first daily news-based economic policy uncertainty [EPU] index for the largest economy in Africa which was hitherto suppressed in the various EPU indices published in recent times. With the renewed interest in Africa as an important destination for investments from developed economies/regions such as Europe, the US, and the UK as well as emerging economies such as China, India, and Russia, among others, in which Nigeria is strategically positioned to benefit from, the need to track the extent of economic uncertainties for the country becomes crucial for investment and policy. Thus, we construct an EPU index from -articles from prominent newspapers in the country using relevant keywords and covers the aftermath of the global financial crisis and also includes the COVID pandemic since the current data scope for the index spans January 01, 2010, to November 30, 2022. We evaluate the in-sample and out-of-sample predictability of the constructed EPU index by examining how it connects with economic/financial variables like exchange rates and stock prices in Nigeria. We provide evidence that lends credence to the inclusion of the index, among other predictors, in the predictive models for the relevant variables to produce more accurate out-of-sample forecasts for them. More importantly, the results are robust to alternative model specifications, different data frequencies, and multiple forecast horizons. We hope to extend this exercise to other useful indices such as geopolitical risk, Financial Stress indicators, and monetary policy uncertainty, among others, which are not readily available for Africa including Nigeria.

Keywords: News, Economic Policy Uncertainty, Nigeria, Machine Learning, Predictability, Forecast Evaluation

JEL Codes: D80, C53, C54

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1. Introduction

The literature on the development of news-based economic policy uncertainty (EPU) indices is gradually emerging and currently, the existing indices are limited to developed and emerging economies (see Baker, Bloom, and Davis (2016), Davis (2016), and Ahir, Bloom, and Furceri (2022))[5,6]. In other words, it is hard to find a replica of any of these EPU indices being replicated for any African country despite increasing representation in the global economic integration as well as strong growth experience over the years (OECD, 2018). In bridging this gap, we construct the index for Nigeria as the largest and most developed economy in the continent. As the largest producer of oil in the continent, some specific uncertainty-triggered events such as oil price shocks usually culminate into panic buying and selling and often lead to a rise in the level of uncertainty in the country. Similarly, discussion around fuel subsidy removal and its implication for fiscal sustainability also has a way of infusing uncertainty into the economic atmosphere of the country. The peculiarity of this to the Nigerian economy is the sudden rise in the prices of goods and services that usually follow each time this debate ensued. Other sources of uncertainty such as unexpected and sudden central bank intervention; policy inconsistencies after elections or when power shifts from one party to another; fall in global oil prices, oil price shocks, and uncertain government response; unethical public policy and practices (see Ozili, 2022), among other sources that are peculiar to Nigeria, have strengthened our interest in this economy. To the best of our knowledge, ours is the first attempt to construct a country-specific index of uncertainty for an African country, especially Nigeria.

This study presents a daily index for economic policy uncertainty within the context of Nigeria. Our index covers most of the prominent newspapers in Nigeria such as the Punch, This Day, The Guardian, Business Day, Daily Trust, Tribune, PM news, and Leadership newspapers.[7] We utilize several keywords similar to those of Baker, Bloom, and Davis (2016), Davis (2016), Ahir, Bloom, and Furceri (2022) to make the outcome comparable to the existing EPUs. For each

[5] See, for example, https://www.policyuncertainty.com/; https://fred.stlouisfed.org/searchresults?st=economic+policy+uncertainty

[6] Several empirical studies using these indices have provided evidence that lends credence to their usefulness in the predictability of economic and financial series (see for a review, Al-Thaqeb, and Algharabali, 2019).

[7] In selecting the newspapers for the construction of the index, there are a few criteria that need to be considered. These include credibility, readership or audience, frequency of publication, and availability.

of these newspapers, we retrieve daily news articles containing terms such as uncertainty, uncertain, uncertainties, economic, economy, senate, deficit, the central bank of Nigeria, legislation regulation, house of representatives, house of reps, national assembly, and CBN, published between 2010 and 2023. One important selling point of our index is that it is of daily frequency and therefore information about public sentiments on any policy decision in the country will come in handy for relevant authorities to review and process for further actions. In addition, with our daily data scope covering the period of 5/1/2010 - 3/9/2023[8], we offer the first comprehensive daily dataset on the EPU index for Nigeria. It is however important to highlight that our study relates to those of Baker, Bloom, and Davis (2016), Davis (2016), and Ahir, Bloom, and Furceri (2022), except that we focus on the continent that is hardly represented in the construction of country-specific indices including EPU index. Thus, we contribute to the growing literature using articles published in the prominent newspapers of Nigeria to construct the uncertainty index. Similar efforts include the geopolitical risk constructed by Caldara and Iacoviello (2019), climate policy uncertainty by Faccini, Matin, and Skiadopoulos (2021), global fear index due to COVID-19 by Salisu and Akanni (2020), uncertainty due to COVID-19 pandemic by Narayan, Iyke, and Sharma (2021), among others. We do hope to extend the literature on Africa to the mentioned indices which currently lie outside the focus of this study.

We test the applicability of our EPU index by conducting some empirical exercises with a number of financial series such as stock price and exchange rate to assess how these series connect with the index as established in the literature (see for example, Xu, 2020). Our choice of variables for the empirical application is motivated by their high exposure to systematic and unsystematic risks (see De Santis, 2018). We show results that lend credence to the predictive contents of the constructed EPU index for Nigeria. More importantly, we demonstrate that including the index in the predictive models for financial series such as exchange rate and stock prices improve their forecasts.

Following this introduction, the rest of the paper is structured thus. Section 2 presents the steps involved in constructing the EPU index. While the penultimate section demonstrates and

[8] This period is determined by the availability of consistent information on the relevant keywords. Nonetheless, the data scope enables us to evaluate the uncertainty associated with the aftermath of the global financial crisis as well as the global oil shock between 2007/2008.

presents the results from the empirical application using the EPU index, the final section, Section 4 anchors the conclusion of the study.

2. Methodological procedure for the EPU index

2.1 Data collection

The procedure for developing a text-based index usually begins with the identification of keywords that relate to economic policy. Note that there are several EPU indices already published (see https://www.policyuncertainty.com/) albeit with a focus on developed and emerging economies without any representation from Africa. One common feature of these indices is that they adopt similar keywords whose choice is pioneered by Baker et al. (2016) to facilitate cross-country comparison of datasets. In light of this, we adopt similar keywords such as uncertainty, uncertain, uncertainties, economic, economy, senate, deficit, the central bank of Nigeria, legislation, regulation, house of representatives, house of reps, national assembly, and CBN. Note some keywords that reflect the peculiarities of Nigeria such as the Central Bank of Nigeria, House of Representatives, house of reps, national assembly, and CBN are included to produce a more realistic index for Nigeria.

The second step involves the extraction of these keywords from eight notable newspapers in Nigeria using Web Scraping, API Access, Sitemaps Access, and RSS Feeds, among other tools.[9] As previously noted the newspapers are the Punch, ThisDay, The Guardian, Business Day, Daily Trust, Nigerian Tribune, PM news, and Leadership newspapers. Table 1 shows the number of newspapers downloaded and those containing at least a keyword. At the end of the procedure, we obtain a daily word count for each of the keywords over the period of 1/1/2010 - 11/30/2022.[10]

[9] Web Scraping involves using software tools such as BeautifulSoup, Scrapy, Playwright, and Selenium to extract data from websites. It is used to scrape news articles from Nigerian newspapers' websites and store them in a database for further analysis. Also, some Nigerian newspapers provide APIs that allow developers to access their news articles. This method is also used to access news articles directly from the newspapers' servers and store them in a database for further analysis. We also consider sitemaps where it is possible to extract the URLs of news articles and automate the download of the articles. This method is faster and more efficient than web scraping or manual collection since it provides a structured way to access news articles. In addition, some Nigerian newspapers provide RSS feeds that can be subscribed to for automated updates on news articles. This method is used to download news articles automatically as they are published and store them in a database for further analysis. Finally, we also adopt the manual collection approach which involves manually collecting newspapers and physically clipping or scanning relevant news articles. While this method is more time-consuming, it becomes necessary in cases where newspapers do not have digital versions or APIs.

[10] Note that some of these newspapers have been in existence before the start date of the index data scope, however, information about the keywords was very scanty before 5/1/2010 with several gaps which obviously cannot be used for any meaningful empirical analyses.

2.2 Index Construction

To construct the index, we sum the daily word count for all the keywords, defined in this paper as EPU, and thereafter, we run a heteroskedasticity-consistent ordinary least squares (OLS) regression of EPU on day-of-the-week dummy variables to accommodate the possible distinct variations in public sentiments in the 5 days of the week.[11] To avoid dummy trap, we exclude the Friday dummy while the resulting constant and residuals from the OLS model are added to adjust the data for day-of-the-week effects:

$$EPU_t = \alpha + \sum_{i=1}^{4} \beta_i D_{i,t} + \varepsilon_t \quad ; \quad i = 1,2,3,4; \quad t = 1,2,...,T . \tag{1}$$

where EPU is the daily sum of word count for each of the keywords; $D_{i,t}$ is for the week-day dummy variables for 4 days (for a 5-day week) since one dummy has to be excluded to avoid dummy trap; α is the regression constant while ε_t is the disturbance term. In the appendix (Table A1), we present the regression estimates for the dummy variables of the day-of-the-week effects and they are found to be significant. The (day-of-the-week) adjusted EPU (EPU_t^{adj}) is obtained as $EPU_t^{adj} = \hat{\alpha} + \hat{\varepsilon}_t$. In the final step, we compute the index as:

$$EPU_t^{adj}\ \text{index} = \left(\frac{EPU_t^{adj} - \min\left(EPU_t^{adj}\ \text{index}\right)}{\max\left(EPU_t^{adj}\ \text{index}\right) - \min\left(EPU_t^{adj}\ \text{index}\right)} \right) * 100 \tag{2}$$

Table 1: Some useful highlights of the EPU index for Nigeria

	PUNCH	TRIBUNE	PMNEWS	THIS DAY	THE GUARDIAN	BUSINESS DAY	DAILY TRUST	LEADERSHIP
No. of news articles downloaded	361,170	199,569	234,409	230,135	163,786	236,057	435,430	1,707
No. of news articles containing at least a keyword	94,312	69,651	52,662	90,712	151,767	92,956	112,028	1,580

[11] This is an important feature of daily frequency variables that connect with investors and practitioners which has to be incorporated into the construction of the index to make it more realistic (see for example, Narayan, Iyke, and Sharma, 2021). This phenomenon has been largely validated in the finance literature where it is assumed that the same information may have differing effects during the days of the week as the average daily return of the market is not the same for all the days of the week (see Drogalas et al., 2007).

3. Some empirical analyses

3.1 Some preliminary analyses

We offer to study the behavior of the EPU_t^{adj} index in two ways. One, we provide some descriptive statistics and graphical representations of the index, and two, we complement one with some data analyses that attempt to connect the index with the predictability of relevant financial variables such as exchange rates and stock prices that are assumed to respond to uncertainties. We present the descriptive statistics in Table 2 for different frequencies involving daily, weekly, and monthly frequencies. Expectedly, we show that the dispersion of the index declines with lower frequency judging by both standard deviation and coefficient of variation. This observation is also evident in Figures 1, 2, and 3 where daily frequency shows greater dispersion than weekly and monthly while the latter has the least dispersion. Even the formal tests for serial correlation and conditional heteroscedasticity in Table 3 show larger values of the test statistics for a higher (daily) frequency than a relatively lower (monthly) frequency. In addition, a closer look at the figures suggests greater uncertainties since 2015 coinciding with the period of oil price shock, economic recession, and the COVID-19 pandemic up to the period of the Naira redesign policy and its fallouts.

We also probe further to tease out any possible connection between the index and exchange rate in Nigeria by providing graphical evidence as depicted in Figure 4. We can find a somewhat positive connection between exchange rate appreciation and the index, a piece of evidence that is empirically investigated in the next section. In other words, higher economic uncertainties may drive higher depreciation of the Naira. Similarly, rising economic uncertainties appear to discourage increased investments in the stock market as the two variables seem to be negatively related (see Figure 5).

Table 2: Descriptive statistics of the EPU index

	Daily	Weekly	Monthly
Mean	26.3642	26.3642	26.2519
Std. Dev.	19.0016	18.5015	18.2845
CoV	0.7207	0.7018	0.6965
Observations	3440	688	159

Note: CoV is the Coefficient of Variation computed as the ratio of standard deviation to mean.

Table 3: Formal tests of the EPU index

	Daily	Weekly	Monthly
Q-stat [5]	14832***	3092.6***	689.40***
Q-stat [10]	28984***	6016.0***	1275.8***
ARCH-LM [5]	443.9605***	141.2665***	39.0484***
ARCH-LM [10]	231.9177***	74.16207***	17.1316***
Observations	3440	688	159

Note: The Q-stat is for serial correlation while the RAHCH-LM test is for conditional heteroscedasticity test. ***, ***, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Figure 1: Trends in the daily EPU Index, January 01, 2010 – November 30, 2022.

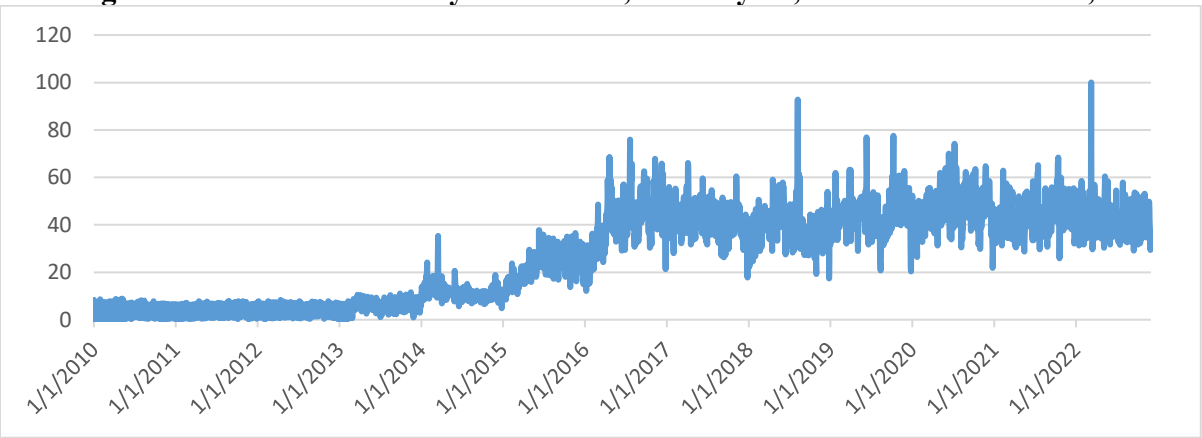


Figure 2: Trends in the weekly EPU Index, January 01, 2010 – November 30, 2022.

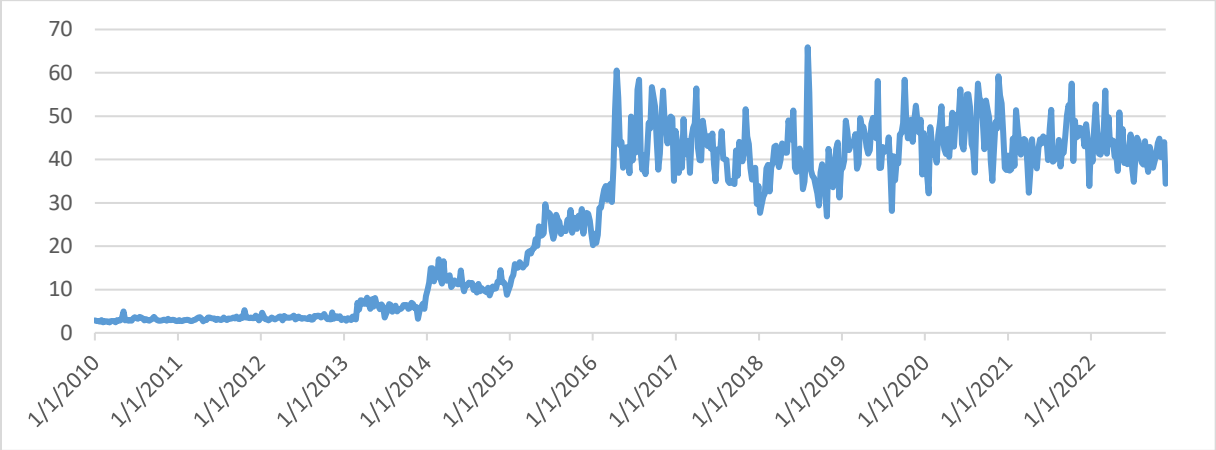


Figure 3: Trends in the monthly EPU Index, January 2010 – November 30, 2022.

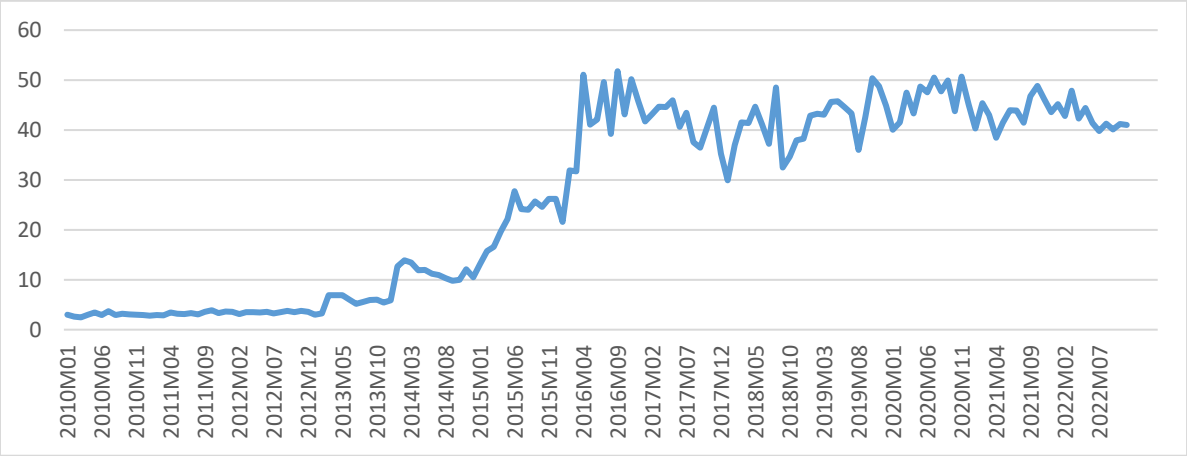


Figure 4: The connection between the EPU index and exchange rate in Nigeria, March 2012 – November 30, 2022.

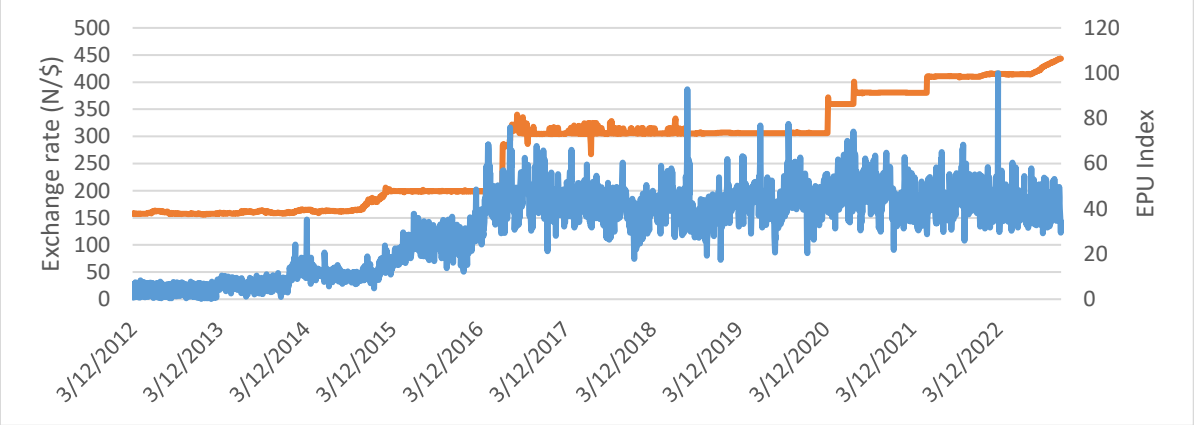
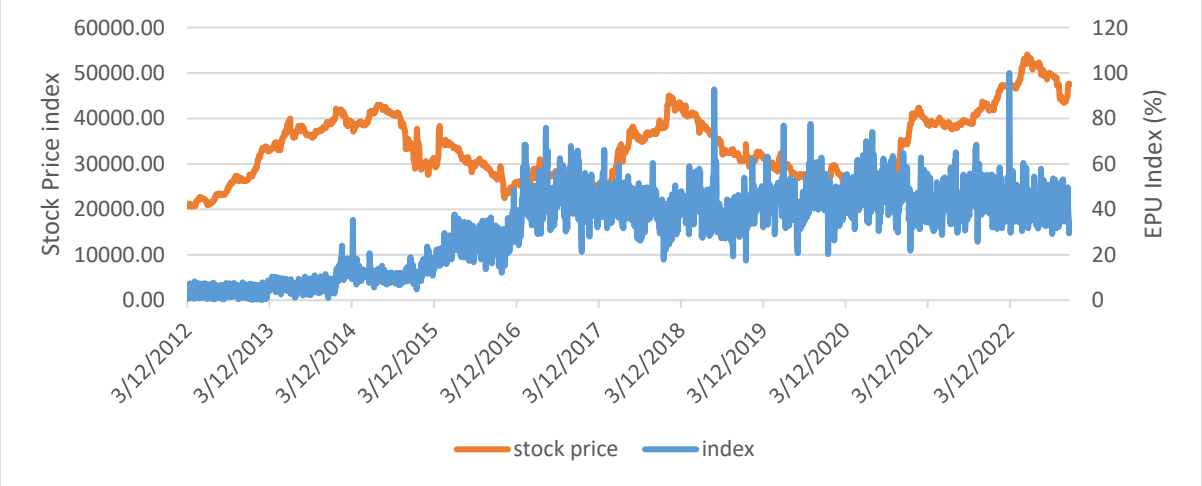


Figure 5: The connection between the EPU index and Stock prices in Nigeria, March 2012 – November 30, 2022.



3.2 In-sample and Out-of-sample Predictability of the EPU_t^{adj} index

3.2.1 The Predictive Model

We construct a predictive model distinctly for the realized volatilities of the exchange rate and stock returns where the EPU_t^{adj} index serves as a predictor.[12] There is increasing evidence in the literature supporting the inclusion of news-based EPU indices in the predictability of financial series (see for a review, Al-Thaqeb, and Algharabali, 2019). The predictive model follows the approach of Westerlund and Narayan (2012, 2015) which simultaneously accounts for some salient data features typical of high-frequency time series, such as persistence and conditional heteroscedasticity as exhibited by our variables (see Table 3). Recent studies using this methodology have demonstrated its usefulness in improving predictability outcomes (see, for example, Narayan and Bannigidadmath, 2015; Narayan and Gupta, 2015; Phan et al., 2015; Bannigidadmath and Narayan, 2016; Devpura et al., 2018; Salisu et al., 2019a, 2019b, among others). In addition, we account for possible shifts in the realized volatilities of the exchange rate and stock returns based on the day-of-the-week effect. Accounting for any inherent level shift in the series, if it exists, tends to enhance the predictability of outcomes (see Salisu et al., 2019a, 2019b, among others). Given this background, the predictive model is written as:

$$RV_t = \alpha + \rho RV_{t-1} + \beta EPU_{t-1}^{adj} + \gamma\left(EPU_t^{adj} - \psi EPU_{t-1}^{adj}\right) + \sum_{i=1}^{4}\delta_i DUM_{i,t} + \varepsilon_t \qquad (3)$$

where RV_t is a 22-day realized volatility of Nigeria's exchange rate/stock returns computed at period t; EPU_t^{adj} is the log-transformed news-based economic policy uncertainty index for Nigeria at the time t; $DUM_{i,t}$ is the i^{th} day-of-the-week dummy; α is the intercept; β is the predictability coefficient; $\gamma\left(EPU_t^{adj} - \psi EPU_{t-1}^{adj}\right)$ is included to correct for any bias resulting from persistence effect EPU_t^{adj}; δ_i is the coefficient for the day-of-the-week dummy; ε_t is a zero mean idiosyncratic error term. Since we are using daily data, it will not be out of place to suspect the conditional heteroscedasticity effect (in fact, our preliminary test in Table 3 confirms this suspicion). Thus, to resolve this effect, we pre-weight equation (2) with the standard deviation of its residuals and, thereafter, re-estimate the resulting equation with the Ordinary Least Squares to

[12] Several studies have established a strong between EPU and financial /economic series including but not limited to exchange rate and stock returns (see for example, Kol, 2014; Si et al. 2021; Yuan et al. 2022).

obtain the Feasible Quasi-Generalized Least Squares estimates (see Westerlund and Narayan, 2012, 2015).

In the final set-up, we evaluate the forecast performance of equation (1) relative to the benchmark (driftless random walk) model. We use the single and pairwise forecast measures where the former involves the relative root mean square error while using the Clark and West (2007) and Diebold and Mariano (1995) tests in the latter case. The relative root mean square error (RMSE) is computed as $1-(RMSE_{UR}/RMSE_{R})$ where $RMSE_{UR}$ is the RMSE for the unrestricted (EPU_t^{adj}) model while $RMSE_{R}$ is the RMSE for the restricted (random walk) model. Therefore, a positive value of the relative RMSE indicates the superior performance of the unrestricted model over the restricted variant, while the reverse holds for a negative relative RMSE. Since both the restricted and unrestricted models are nested, the Clark and West (2007) [Clark-West] test is used. A statistically significant positive value implies the outperformance of EPU_t^{adj} -based model the benchmark model and vice versa for a statistically significant negative value. We utilize a 75:25 data split respectively for both the in-sample predictability and out-of-sample forecast evaluation. In the out-of-sample period, we consider 40- , 80- and 120- (daily) periods ahead of forecast horizons under a rolling window framework that allows for some time variation. The corresponding weeks and months are used for the predictability involving weekly and monthly frequencies, respectively.

3.2.2 Results and Discussion

We begin our analyses with equation (3) which is the model without any additional (control) variable and thereafter we estimate an extended version that includes oil price volatility as a control variable. The connection between oil price and exchange rate (see for example, Huang et al., 2020; Salisu et al., 2020) on the one hand and oil price and stock returns (see for example, Narayan and Gupta, 2015; Salisu et al., 2019c, 2019d) on the other hand is well established in the literature. Note that both variants of the predictability analyses involving daily data include the day-of-the-week effects while they are expectedly excluded for weekly and monthly frequencies. In the case of the former, all the differential intercept coefficients are statistically significant (see Tables A2 and A3 in the appendix) indicating the existence of these effects in the behavior of both exchange rate and stock returns. In Table 4, we present only the predictability coefficient of the EPU index

under the two model scenarios (with and without an additional (control) variable) and for three different frequencies, daily, weekly and monthly. The full results are presented in the appendix (see Tables A2, A3, and A4 for the daily, weekly, and monthly frequencies, respectively).

We utilize the full data sample to establish the relationship between the EPU index and the selected financial series. For forecast analyses, 75% of the data sample are used for the in-sample estimation while the out-of-sample forecast evaluation is determined from the balance. As expected, we show that the index significantly influences the behavior of the exchange rate and the stock market in Nigeria (see Table 4). More specifically, the index positively relates to exchange rate return volatility for both daily and weekly frequencies (in line with our observation in Figure 4) while it is negative for the monthly frequency. In other words, for the positive association, we can conclude that higher uncertainties create negative signals in the domestic economy which may discourage capital inflow and thus raise the level of currency depreciation (see also, Krol, 2014). The negative relation observed between the index and exchange rate volatility for the monthly frequency is not far-fetched given that the official exchange rate is used in this study. In the case of Nigeria which is characterized by managed floating exchange rate mechanism, the monetary authority intervenes at intervals to moderate any noticeable deviation between the official and "market-based" exchange rates. Therefore, any significant volatility in the exchange rate in the early days of a month can be moderated by the month-end with the intervention of the monetary authority. We however observe consistent results for the stock market since this market is largely market-driven and does not enjoy the kind of interventions extended to the foreign exchange market in Nigeria. Specifically, we establish a negative connection between the index and stock return volatility (as depicted in Figure 5) which is an indication that higher uncertainties may discourage future investment in the stock market thereby reducing the trading activities and by extension the market volatility.

We also conduct some simple forecast analyses using the Clark and West (2007) measure of forecast evaluation since the competing (restricted and unrestricted) models are nested. We present the results in Tables 5, 6, and 7 for daily, weekly, and monthly data frequencies, respectively. We show that our index offers more accurate forecasts for the financial series being examined than the benchmark model. We observe greater forecast outcomes for the stock market than the foreign exchange market as the forecast outcome for the former consistently improves across the three data frequencies and over the forecast horizons unlike the latter where the

benchmark model outperforms the index-based model at a lower frequency. As noted previously, the incessant interventions of the relevant authority in the foreign exchange market may limit the predictability of the index at a lower frequency during which such interventions are undertaken. In other words, investors in the stock market tend to monitor the state of macroeconomic conditions when making investment decisions. This outcome also aligns with the Arbitrage Pricing Theory which assumes that individual stocks respond to macroeconomic risks. In sum, the outcome lends credence to the appropriateness and adequacy of the index in measuring uncertainties in Nigeria.

Table 4: In-sample predictability results for the Index

	Daily	**Weekly**	**Monthly**
	Exchange rate volatility		
Without control	1.051683***	0.053583***	-0.191042***
	(0.084810)	(0.011184)	(0.061541)
With control	1.129433***	0.098456***	-0.125516***
	(0.083992)	(0.012198)	(0.035154)
	Stock return volatility		
	Daily	Weekly	Monthly
Without control	-0.036926***	-0.040734***	-0.137074***
	[0.008523]	(0.015365)	(0.043248)
With control	-0.037483***	-0.060518***	-0.133837***
	(0.008736)	(0.017126)	(0.049028)

Note: We only report the predictability coefficient for the EPU index in the table while the full results are presented in the appendix. “Without control” implies that equation (2) is estimated without any additional variable while "with control" denotes the estimation of the equation with an additional (control) variable which is oil return volatility in this case. . ***, ***, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5: Daily Out-of-sample predictability results for the EPU Index [Using Clark and West (2007) test]

	Exchange rate volatility		
	40-days	**80-days**	**120-days**
Without control	21.63027***	21.79193***	22.24452***
With control	20.98446***	21.14442***	21.59242***
	Stock return volatility		
	40-days	**80-days**	**120-days**
Without control	4.151973***	4.151683***	4.151405***
With control	3.762147***	3.761935***	3.761730***

Note: A significantly positive test statistic of the Clark and West (2007) test implies the superior performance of the EPU index-based model over the benchmark model while the reverse holds if the test statistic is not different from zero. . ***, ***, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

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able 6: Weekly Out-of-sample predictability results for the EPU Index [Using Clark and West (2007) test]

	Exchange rate volatility		
	8-week	16-weeks	24-weeks
Without control	14.25731***	14.53623***	14.79745***
With control	14.43682***	14.70514***	14.95683***
	Stock return volatility		
	8-week	16-weeks	24-weeks
Without control	6.260694***	6.879339***	5.700634***
With control	5.878785***	6.524263***	5.346740***

Note: A significantly positive test statistic of the Clark and West (2007) test implies the superior performance of the EPU index-based model over the benchmark model while the reverse holds if the test statistic is not different from zero. . ***, ***, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7: Monthly Out-of-sample predictability results for the EPU Index [Using Clark and West (2007) test]

	Exchange rate volatility		
	2-months	4-months	6-months
Without control	-0.834023	-0.595661	-0.442321
With control	2.151452**	2.374689**	2.528680**
	Stock return volatility		
	2-months	4-months	6-months
Without control	4.064133***	4.367939***	4.665204***
With control	3.921743***	4.225188***	4.522711***

Note: A significantly positive test statistic of the Clark and West (2007) test implies the superior performance of the EPU index-based model over the benchmark model while the reverse holds if the test statistic is not different from zero. . ***, ***, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

4. Conclusion

Our effort in this study is to fill an obvious gap in the literature in the area of the computation of economic uncertainty indices. It is generally observed that all the countries in Africa are hardly captured in the existing indices thus making it difficult to conduct related studies on Africa. With the increasing uncertainties associated with the aftermath of the COVID-19 pandemic and the Russia-Ukraine war and how such are projected to impact the African continent, the proposed EPU index will come in handy when making making investment and policy decisions at least for one of the leading countries in Africa. This is the motivation for the study. Thus, as a preliminary step towards providing a platform that tracks the extent of uncertainties in Africa, we focus on its largest economy, Nigeria, while we hope to extend this exercise to other emerging economies on the continent in the foreseeable future.

Essentially, the economic policy uncertainty index involves prominent newspapers in Nigeria we scrape their articles to identify relevant keywords which are then used to construct the index. Consequently, we offer several analyses to test the predictability of the index, particularly for exchange rate and stock return volatility. We find that the index contains useful predictive contents that can be exploited to improve the out-of-sample forecast of exchange rate and stock returns albeit with greater out-of-sample predictive power for the latter when a lower frequency is used. Overall, the index more prominently positively connects with the exchange rate while it does so in a negative way with stock returns. In other words, higher uncertainties can cause the exchange rate to depreciate further, and similarly, it can discourage future investment in the stock market. The outcome aligns with the evidence in the theoretical and empirical literature regarding how uncertainties connect with economic and financial variables. Given that the proposed index is available at a high frequency, information about public sentiments on any policy decision in the country will come in handy for relevant authorities to review and process for further actions.

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Appendix

Table A1: The regression results for the adjusted EPU index (EPU_t^{adj})

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	428.4230	17.7427	24.1465	0.0000
Monday	78.5160	8.47909	9.2600	0.0000
Tuesday	99.9128	9.31161	10.7299	0.0000
Wednesday	126.5436	9.8390	12.8614	0.0000
Thursday	74.8706	8.2550	9.0697	0.0000
F-statistic			9.57	
Prob(F-statistic)			0	

Note: The weekdays are captured in the regression analyses as dummy variables while the Friday dummy is excluded to avoid dummy trap. The regression analyses involve the Heteroscedasticity and Autocorrelation Consistent OLS estimator to accommodate the inherent statistical effects in the EPU data as observed in the preliminary analyses.

Table A2: The daily predictability results of the EPU index

Variable	Exchange rate return volatility		Stock return volatility	
	Without Control	With Control	Without Control	With Control
C	-9.22303***	-12.62623***	1.382498**	1.379605**
	(3.428149)	(3.439773)	(0.572174)	(0.561725)
RV_{t-1}	0.495015***	0.474497***	1.099397***	1.096207***
	(0.031404)	(0.030647)	(0.011761)	(0.011749)
$\left(EPU_t^{adj} - \psi EPU_{t-1}^{adj}\right)$	2.596877***	2.383679	0.112655***	0.071461***
	(0.04728)	(0.089687)	(0.01789)	(0.018377)
EPU_{t-1}^{adj}	1.051683***	1.129433***	-0.03693***	-0.037483***
	(0.08481)	(0.083992)	(0.008523)	(0.008736)
Monday	51.67525***	50.60046***	1.901423***	1.739003***
	(1.906257)	(2.182699)	(0.494235)	(0.486350)
Tuesday	-13.6844***	-11.73534***	5.095248***	4.911911***
	(2.913179)	(2.895378)	(0.469641)	(0.462361)
Wednesday	3.247829	5.932685*	4.894559***	4.784712***
	(3.421999)	(3.365002)	(0.452815)	(0.444823)
Thursday	-5.62611*	-1.714836	4.836352***	4.202465***
	(3.206084)	(3.179438)	(0.460668)	(0.460783)
$\left(OIL_t^{adj} - \psi OIL_{t-1}^{adj}\right)$		1.154302***		0.149235***
		(0.160503)		(0.020791)
OIL_{t-1}^{adj}		-0.022770		0.006340*
		(0.015071)		(0.003399)

Note: The weekdays are captured in the regression analyses as dummy variables while the Friday dummy is excluded to avoid dummy trap. The regression analyses involve a Feasible Quasi Generalized Least Squares estimator to accommodate the inherent statistical effects in both the predictor and predicted series as depicted in the preliminary analyses. ***, ***, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. The values in parentheses denote the standard errors. The predictability results for the EPU index are highlighted in green color.

Table A3: The weekly predictability results of the EPU index

Variable	Exchange rate return volatility		Stock return volatility	
	Without Control	With Control	Without Control	With Control
C	1.577471***	0.402227*	1.453871***	2.238460***
	(0.152490)	(0.231189)	(0.180675)	(0.302606)
RV_{t-1}	0.873407***	0.879404***	1.056430***	1.061821***
	(0.026493)	(0.024449)	(0.011995)	(0.014118)
$\left(EPU_t^{adj} - \psi EPU_{t-1}^{adj}\right)$	-0.007560***	0.024976*	-0.140085***	-0.148739***
	(0.014136)	(0.013958)	(0.019781)	(0.021291)
EPU_{t-1}^{adj}	0.053583***	0.098456***	-0.040734***	-0.060518***
	(0.011184)	(0.012198)	(0.015365)	(0.017126)
$\left(OIL_t^{adj} - \psi OIL_{t-1}^{adj}\right)$		0.155115***		-0.051746
		(0.052635)		(0.055849)
OIL_{t-1}^{adj}		0.038678***		-0.040411***
		(0.007460)		(0.012281)

Note: The regression analyses involve a Feasible Quasi Generalized Least Squares estimator to accommodate the inherent statistical effects in both the predictor and predicted series as depicted in the preliminary analyses. ***, ***, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. The values in parentheses denote the standard errors. The predictability results for the EPU index are highlighted in green color.

Table A4: The monthly predictability results of the EPU index

Variable	Exchange rate return volatility		Stock return volatility	
	Without Control	With Control	Without Control	With Control
C	3.186900***	0.532191*	2.046731***	2.187820***
	(0.302175)	(0.312320)	(0.393756)	(0.508160)
RV_{t-1}	0.714407***	0.940790***	0.973665***	0.966321***
	(0.045084)	(0.031096)	(0.036631)	(0.039062)
$\left(EPU_t^{adj} - \psi EPU_{t-1}^{adj}\right)$	-0.121667**	-0.146241***	-0.049190	-0.036437
	(0.051111)	(0.030137)	(0.036004)	(0.040740)
EPU_{t-1}^{adj}	-0.191042***	-0.125516***	-0.137074***	-0.133837***
	(0.061541)	(0.035154)	(0.043248)	(0.049028)
$\left(OIL_t^{adj} - \psi OIL_{t-1}^{adj}\right)$		0.436557***		-0.042454
		(0.045336)		(0.066972)
OIL_{t-1}^{adj}		0.031770***		-0.003034
		(0.006279)		(0.013245)

Note: The regression analyses involve a Feasible Quasi Generalized Least Squares estimator to accommodate the inherent statistical effects in both the predictor and predicted series as depicted in the preliminary analyses. ***, ***, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. The values in parentheses denote the standard errors. The predictability results for the EPU index are highlighted in green color.