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Short Communication

Benchmarking Nigeria's Crude Oil Price in a Climate of Falling Prices

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Abstract

The aim of this paper is to find the trough price corridor that the current decline in crude oil price would attain and the length of time it would take before it regains recovery. Following Kanda (2011) simple calibration and geometric progression were used for the analysis of secondary data collected. It was found that crude oil price would continue to decline until it reaches $52.2pb (with a band of ±$10.2pb) and then revive after a month, 2 weeks and 4 days from December 2014. The paper concludes that it would be safe to set the crude oil benchmark for Nigeria's 2015 budget within a corridor of $42pb to $62.4pb to allow for savings in the Sovereign Wealth Fund.

Keywords: Crude oil Price, Benchmarking, Geometric Progression, National Budget

INTRODUCTION

The current decline in the price of crude oil is nothing new (Ezenwe, 2014). It was a common phenomenon in the 1980s that also contributed to the global economic crisis of 2008-2010 and now has now seen crude oil prices decline by 28.3 percent from $112.27 in June 2014 to $80.5 in November 2014. While all oil producing countries are vulnerable to the negative effects of falling oil prices, Nigeria's sensitivity to it is critical as it is a sole determinant of Nigeria's revenue. Though several studies (e.g., Ekpo, 2014; Obadan, 2014 etc.), have examined the impact of the falling crude oil price on the Nigeria economy. Others (e.g. Ezenwe, 2014; Taiwo, 2014) have raised questions about how long it will take before the falling oil price records an upturn. None however has estimated the length of time it will take before a trough is reached and the minimum price before such turn is recorded. Yet answering such question is critical as crude oil price has continued to fall and has fallen below the revised benchmark used to make projections for the nations Medium Term Expenditure Framework (MTEF).

Using descriptive, trend and geometric models, this paper seeks to fill these gaps. This paper therefore seeks to answer the following research questions: How long will the present (Present means the falling crude oil price situation recorded at the international market from June 2014 into 2015) decline recorded in crude oil price last? And what would be the minimum price corridor it will reach before recovery? Policy deduction on the crude oil price to be used in planning the nation's 2015 budget would also be suggested.

RESULTS AND DISCUSSION

Simple calibration and geometric progression methods are employed for the analysis of secondary data collected. Kanda (2011) used similar approach to find a reasonable period to announce fiscal tightening plans, and also to provide useful insights into key questions raised by policy makers concerning fiscal consolidation in a number of European countries. The analysis is in two sections: (a) Calibrating the minimum fall in crude oil price and, (b) Estimating the length of time the decline is expected to last.

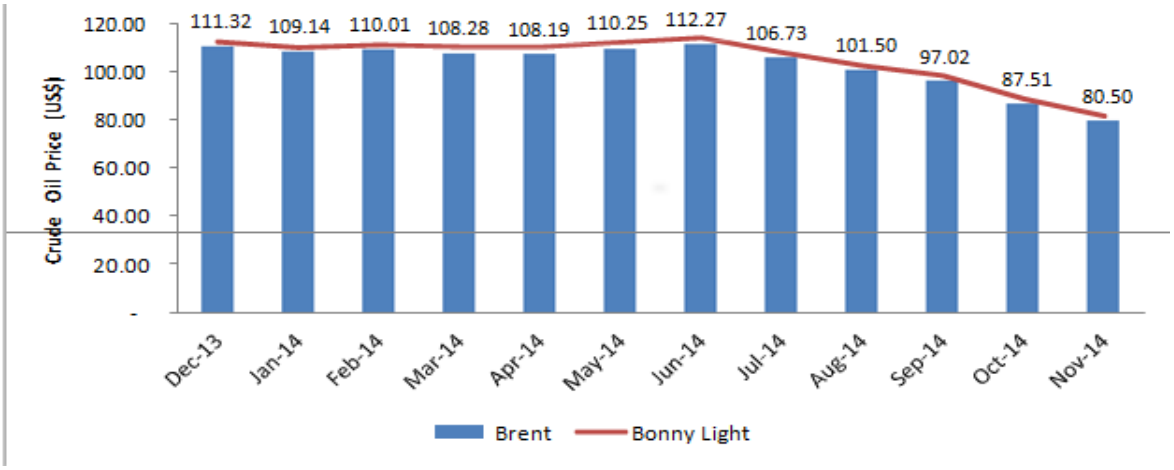


Figure1. Trend of Crude Oil Price (Brent and Bonny Light): Dec 2013 – Nov 2014 (in US$)
Source: Reuters/Olu Ajakaiye

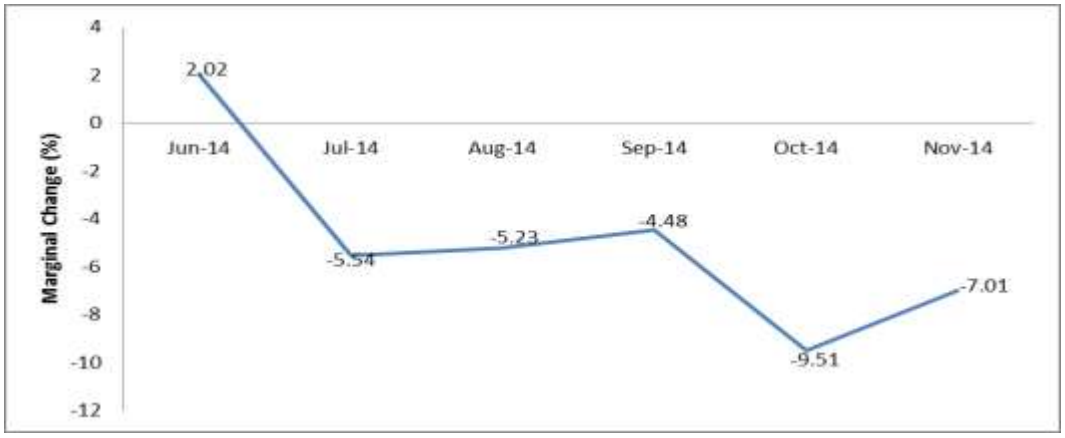


Figure2. Trend of Crude Oil Price Decline Rate (%)
Source: Authors

- **Calibrating the Minimum Fall in Crude Oil Price**

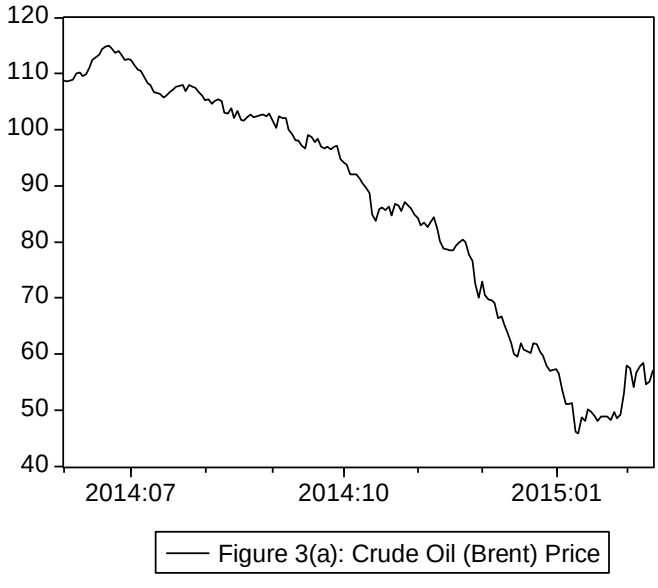
The trend showing how crude oil price moved from December 2013 to November 2014 is presented in Figure1. It shows glaringly how crude oil that have remained relatively stable peaked in June 2014 and declined afterwards.

According to J.P Morgan, analyst fear that oil prices might fall further to $70 by December 2014 and $65 by January 2015 (Ezenwe, 2014). We provide alternative evidence to cross examine this position and find a lower turning point for crude oil price. In the last quarter of 1979, crude oil price fell from $80pb to $38pb in early 1980s. This represents a decline of 53 percent. During the 2008 global economic crisis, crude oil price fell from $147pb in July 2008 to $67.5pb by October 2008; representing a decline by 54 percent. Taking the average of the decline in percentages in the 1980s and 2008, yields 53.5 percent. The peak crude oil price from December 2013 to November 2014 was $112.27 in June 2014. Thus, 53.5 percent of this price yields $60.06pb and when subtracted from $112.27 is $52.2pb. Thus, following historical antecedents, the current decline in crude oil price would continue until it hits $52.2pb.

- **Estimating the Length of Time the Decline is Expected to Last**

Though the calibration above shows the minimum crude oil price that the current decline could attain, it does not tell how long. Available data from Reuters and Olu Ajakaiye (see Ezenwe, 2014) shows that crude oil price in 2014 peaked at $112.27bp in June. Using this data, we work out the percentage decline in crude oil prices. The result shows that crude oil price increased marginally by 2.02 percent from May 2014 to $112.27pb in June and declined by 5.23 percent in August. Likewise, within September to October 2014, it declined marginally by 9.51 percent and by 7.01 percent from October to November (see Figure2).

From the computed rate of change in Figure2, we fit



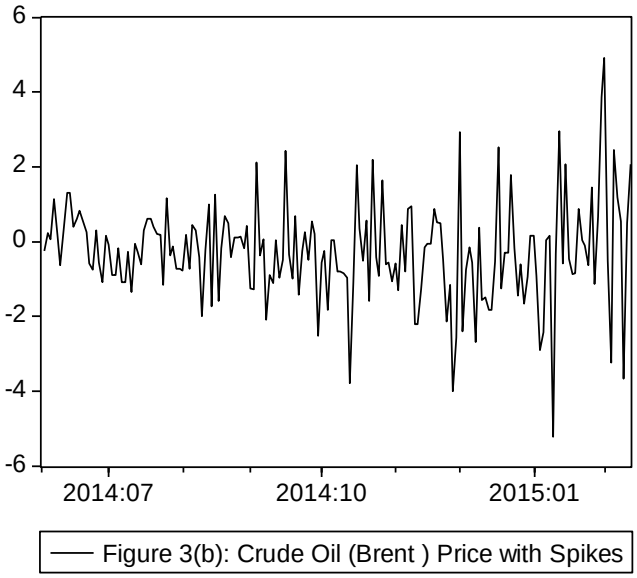


Figure3 (a) Crude Oil Price (Brent $): Jun 2nd 2014 to Feb 12th 2015
Figure3 (b) Crude Oil Price (Brent $): Jun 2nd 2014 to Feb 2015 (with first difference to reveal spikes)
Source: Bloomberg, 2014/2015 (Daily data collected by authors)

a geometric series to determine the length of time it would take to attain the minimum price of $52.2pb. The result (see details at the Appendix) shows that crude oil price will continue to fall in the next 1 month 2 weeks and 4days to recover when it reaches a trough of $52.2pb with a bandwidth of ±$10.2pb.. It would therefore be safe to set the crude oil benchmark for Nigeria's 2015 budget within the corridor of $42pb to $62.4pb to allow for savings in the sovereign wealth fund.

Figure3 (a) above shows the falling crude oil (Brent) price on daily basis from June 2nd 2014 to February 12th 2015. On the y-axis is crude oil (Brent) price in US$ while end points of the period covered in the trend are scaled on the x-axis. Result from the geometric estimation suggested that crude oil price would revive four days after the second week of January 2015. Notice also in Figure3 (a) that Brent price reached a trough in the second week of January. Though competing and conflicting international factors (e.g. conflict in the Middle East, price war between OPEC and emerging shale oil economies etc.) are responsible for the observed fluctuation in crude oil price, the simple calibration and estimation applied, appears to have provided an almost close prediction (if we may), in the debate of when and to what extent the falling crude oil price situation observed in the last half of 2014, would go into 2015. The wide spikes seen in Figure 3(b) as we move from left to right of the trend however shows that volatility in the market might persist in the short to medium term.

Despite the weakness of the technique of analysis, use of short data length and choice of a technique that does include an error term, policy makers concerned with short term cycles and national budget plan could find this communication useful as it informs, to some extent, how long crude oil price will keep falling from 2014 into 2015 and at what price it would record an upturn.

SUMMARY AND CONCLUSION

The aim of this paper is to find the trough price that the current decline in crude oil price would attain and regain recovery. The paper was also interested in the length of time for which it would take to attain this price. Following Kanda (2011) simple calibration and geometric series were used for the analysis. It was found that crude oil price would continue to decline until it reaches $52.2pb and then revive upwards after a month and two (2) weeks. With a standard deviation of $\pm\$10.2$ *pb* , the paper concludes the fall in crude oil price could be around a corridor of $\pm\$52.2$ *pb* (i.e. $42pb to $62.4pb). The JP Morgan prediction of $65pb fell outside this range hence representing a more optimistic view. It would therefore be safe to set the crude oil benchmark for Nigeria's 2015 budget within the corridor of $42pb to $62.4pb.

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APPENDIX

From the computed rate of change (see Fig 2), we fit a geometric series to determine the length of time it would take to attain the minimum price of \$52.2pb. The geometric progression equation is presented below:

$$G = ar^{n-1} \quad (1)$$

where a is the first term, r is the common ratio and n is the period. In this case G is 52.2. Thus, the objective is to find n i.e. the number of time it would take for G to be attained. Taking the log of equation (1) yields

$$\log G = \log a + (n-1)\log r$$

Expanding

$$\log G = \log a + n\log r - \log r$$

Collecting like terms

$$\log G - \log a + \log r = n\log r$$

Re-arranging

$$n\log r = \log G - \log a + \log r$$

Making n the subject formula

$$n = \frac{(\log G - \log a + \log r)}{(\log r)}$$

$$n = \frac{\log(G - a + r)}{(\log r)}$$

Thus, the length of time is

$$n = \left(\frac{\log(G - a + r)}{(\log r)} \right)$$

Fixing the figures in the formula and solving yields

$$52.2 = 2.02\left(2.74\right)^{n-1}$$

$$\log 52.2 = \log 2.02 + (n-1)\log 2.74$$

$$\log 52.2 = \log 2.02 + n\log 2.74 - \log 2.74$$

$$\log 52.2 - \log 2.02 + \log 2.74 = n\log 2.74$$

$$\left(\frac{\log 52.2 - \log 4.76}{\log 2.74} \right) = n$$

$$n = \left(\frac{\log 47.44}{\log 2.74} \right)$$

$$n = \log 17.3139$$

$$n = 1.24$$ i.e. 1 month 2 weeks and 4days