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Assessing Exuberances in Stock Returns of Oil-Exporters

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This study assessed explosive behaviour in the stock market of oil-exporting countries using the Supremum ADF and a Generalized supremum ADF tests to detect multiplicative bubbles in daily stock returns for the period April 15, 2013, to May 15, 2024. The paper, thus, provides evidence of explosive dynamics in stock returns of oil-exporting countries, except in the US, while multiplicative bubbles were detected in the Nigerian and Venezuelan markets. The Panel analysis equally shows explosive patterns, implying that highly exuberant markets dominate the oil exporting bloc.

I. Introduction

Following the Global Financial Crisis (GFC), countries have adopted robust frameworks to monitor financial market activities and consequently embark on timely interventions to correct price and return anomalies. These anomalies could originate from irrational activities in the domestic market, external influences, or fluctuations in commodity prices, all of which can significantly affect stock market dynamics (Biswas et al., 2022; Brunnermeier & Oehmke, 2013; Jordà et al., 2015; Reinhart & Rogoff, 2009). Accordingly, several approaches have been deployed for early detection of price bubbles. A wide range of these methods border on the assessment of price volatilities (Diba, 1990; Gupta et al., 2024; Sornette et al., 2018) and unit roots (Phillips et al., 2015).

The assessment of price bubbles is of primary concern to oil-exporting countries (Tarlie et al., 2022) due to evidence of oil-price induced volatilities and consequent bubbles in the stock market. Although several studies have shown evidence of oil price impacting positively on stock returns (Alamgir & Amin, 2021; Albulescu, 2020; Lawal et al., 2016; Liu et al., 2023; Prabheesh et al., 2020; Salisu & Oloko, 2015; Shi & Kong, 2021), other studies counteract this position (Albulescu, 2020; Al-hajj et al., 2017; Bourghelle et al., 2021; Singhal et al., 2019). This, therefore, suggests a need to re-assess the oil-stock bubble nexus among leading oil-exporters, and by extension, detect the nature of these bubbles, establish their timestamp, and assess their duration, as this information is strongly relevant to policymakers, financial regulators, and market stakeholders.

Although, existing studies (Assaf et al., 2024; Huang & Wang, 2024; Li et al., 2020) have detected stock price bubbles in various markets of oil-exporting and non-oil-exporting economies, however, most of these studies have not performed a panel analysis of the markets. Another gap identified in Potrykus (2023) was the lack of time stamping for the periods of bubble formation. Consequently, this paper aims to fill this gap by detecting specific periods that market bubbles emerged and eloped. We would specifically determine whether the bubbles were multiplicative, both individually across the selected economies and collectively as a panel of oil exporters.

The rest of the paper is structured as follows. Section II presents the data and methodology. Section III presents results and discussions. Section IV contains the conclusion.

II. Data and Methodology

The paper attempts to detect bubbles in stock returns of oil-exporting economies (see Table 1) using a unit root approach. Data used in this paper are daily time series of stock returns of oil exporters, spanning April 15, 2013, to May 15, 2024. The timeframe was chosen based on data availability across the selected countries and the need to capture notable events such as post-GFC, COVID-19, and Russia-Ukraine war, whose impact have been deemed to be significant on stock returns, especially, that of oil-exporting markets. The selection criteria for the oil-exporters were based on the Observatory of Economic Complexities (OEC) rankings with supporting evidence from U.S. Energy Information Administration.

In their novel approach to detecting exuberance in the stock market, Diba & Grossman (1988) proposed an alternative test of unit root by contrasting the right tail of a distribution against its explosive alternative (see Peder-

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Table 1. Full estimation

	Computed Statistics			Date stamping of the Bubbles					
Country	**ADF**	**SADF**	**GSADF**	**Start**	**Peak**	**End**	**Dur**	**Signal**	**Ongoing**
Russia	-1.4	0.004***	3.63	NA	NA	NA	NA	NA	NA
Saudi Arabia	-1.29	0.56***	4.35	NA	NA	NA	NA	NA	NA
Canada	-1.37	-0.204***	5.61	27/02/2020	11/03/2020	13/03/2020	10	negative	FALSE
UAE	-1.1	0.32***	7.77	16/12/2013	06/01/2014	27/01/2014	25	positive	FALSE
				28/01/2014	10/02/2014	18/02/2014	15	positive	FALSE
				20/02/2020	05/03/2020	10/03/2020	11	negative	FALSE
USA	-0.55	0.15	3.97	NA	NA	NA	NA	NA	NA
Kuwait	-1.11	0.201***	3.93	06/12/2016	08/12/2016	19/12/2016	9	negative	FALSE
				02/03/2017	10/03/2017	20/03/2017	11	positive	FALSE
				01/02/2018	09/02/2018	16/02/2018	11	negative	FALSE
				28/08/2018	03/09/2018	07/09/2018	8	positive	FALSE
				13/05/2019	17/05/2019	27/05/2019	10	positive	FALSE
				11/11/2021	25/11/2021	26/11/2021	11	positive	FALSE
Nigeria	0.97	1.7***	6.59**	03/07/2017	05/07/2017	21/07/2017	14	positive	FALSE
				05/11/2020	18/11/2020	08/12/2020	23	positive	FALSE
				25/12/2020	08/01/2021	19/01/2021	14	positive	FALSE
				23/05/2022	31/05/2022	14/06/2022	15	positive	FALSE
				04/01/2024	11/01/2024	20/05/2024	94	positive	TRUE
Norway	-0.8	0.62***	4.2	NA	NA	NA	NA	NA	NA
Brazil	-0.9	0.95***	4.05	12/03/2020	19/03/2020	26/03/2020	10	negative	FALSE
Venezuela	-3.47	2.36***	6.23***	18/11/2013	25/11/2013	11/12/2013	17	positive	FALSE
				17/12/2013	08/01/2014	31/01/2014	28	positive	FALSE
				13/02/2014	04/03/2014	20/03/2014	24	positive	FALSE
				25/03/2014	11/04/2014	24/04/2014	22	positive	FALSE
				09/10/2015	29/10/2015	06/01/2016	60	positive	FALSE
				10/03/2017	20/03/2017	30/03/2017	14	positive	FALSE
				31/03/2017	10/04/2017	19/04/2017	13	positive	FALSE
				29/08/2017	29/01/2018	01/02/2018	108	positive	FALSE
				08/04/2019	15/04/2019	22/04/2019	10	positive	FALSE
				19/12/2022	26/01/2023	10/05/2023	97	positive	FALSE
				16/05/2023	30/05/2023	07/06/2023	16	positive	FALSE

Notes: *** and ** denotes statistical significance at 1% and 5% levels, respectively. The significance of the results implies that we reject the null hypothesis that stock returns in the respective countries indicate exuberance, while failure to reject the hypothesis indicates that the affected stock doesn't exhibit explosive behaviour. Dur denotes the duration that a bubble persists before a bust.

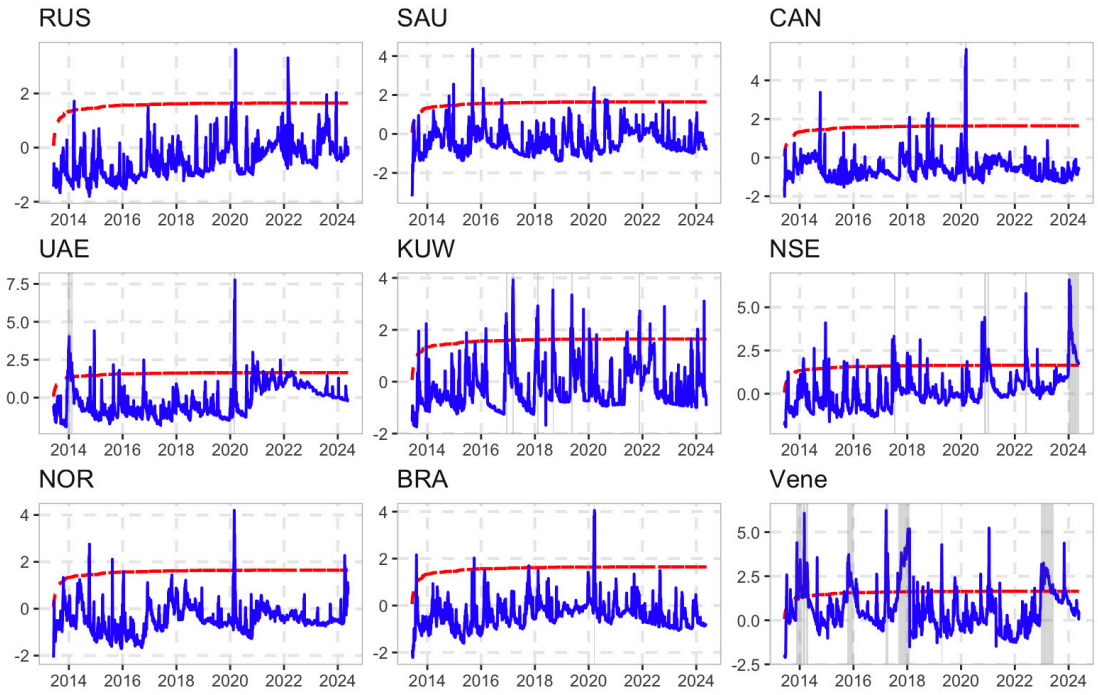

Figure 1. SADF estimates of stock returns

Notes: The symbols RUS, SAU, CAN, UAE, KUW, NSE, NOR, BRA, and VENE represent the stock returns of Russia, Saudi Arabia, Canada, United Arab Emirates, Kuwait, Nigeria, Norway, and Brazil, respectively. Spikes above the red line indicate explosive stock returns in these markets based on the SADF criteria. Stock returns in the USA were not plotted because the system did not detect any bubbles in the US market, despite it being a major oil exporter.

sen & Schütte, 2020). Due to the relative weakness of the method in detecting negative bubbles, it was modified to include using the subset of the test data incremented by one observation at each run, and the largest value of the test statistics to test for explosiveness (see Phillips & Yu, 2011; and Diba & Grossman, 1988). This method is known as the Supremum Augmented Dickey–Fuller (SADF) test. The SADF improves the predicting power of the model even amidst negative bubbles and allows for a near-accurate determination of the cycle of a bubble. In furtherance, Phillips et al. (2015) developed a generalized version of the SADF test (GSADF) by allowing the variance of the sample window based on its start, peak and end period. Thus, the GSADF test is considered to have an even higher power in detecting periodically collapsing bubbles.

The Supremum ADF and generalized supremum ADF tests relies on the ADF regression specification:

$$\Delta y_t = a_{r1,r2} + \gamma_{r1,r2} y_{t-1} + \sum_{j=1}^{k} \varphi^{j}_{r1,r2} \Delta y_{t-j} + \epsilon_t \qquad (1)$$

where y_t denotes a generic time series, Δy_{t-j} with $j = 1, \ldots\ldots, k$ are lagged first differences of the series included to accommodate serial correlation, ϵ_t are normally distributed error terms, and $a_{r1,r2}, \gamma_{r1,r2}$, and $\varphi^{j}_{r1,r2}$ are regression coeffcients, while $r1, r2$ represent windows of the total sample size T that state the starting, peak, and ending points of the subsample period.

The null hypothesis of interest is that variable y has a unit root, against an alternative of the variable having an explosive behaviour.

III. Results

The SADF estimates present several episodes of speculative bubbles among the selected countries. The Venezuelan stocks exhibited the highest duration of explosive behaviours, followed by those of Kuwait, Nigeria, and the UAE. Contrarily, other oil exporters recorded mild explosions in their stock returns. This indicates strong evidence of irrational exuberance in the stock returns of the selected countries, thus, revealing their lack of absorptive mechanisms to dampen impending bubbles in their stock markets. (see further evidence in Abdou et al., 2024). The result also revealed that stock exuberance during the COVID-19 period was largely positive, except in Canada, Brazil, and the UAE where price bubbles were negative.

The Generalized SADF test detected multiplicative bubbles only in Nigeria and Venezuela. This could be attributed to their relatively high dependency on oil (see Figure 1). The persistent positive bubble formation in Venezuelan stock returns implies that beyond the dynamics in the oil market, there are intense speculative activities in the market (see Demirer et al., 2017). Conversely, the US market showed minimal evidence of price bubbles, due largely to broad economic diversification, tight regulations, counter-intuitive measures against oil price swings and minimal currency depreciation effects on stock prices in the US market (see Gupta et al., 2024).

The panel estimation reveals that, as a conglomerate of oil exporters, there is evidence of multiplicative price bubbles in the selected markets, underscoring the need for in-

Table 2. Panel estimates

Panel Analysis	Critical Values		
Computed Statistic	**90%**	**95%**	**99%**
1.67***	0.47	0.49	0.58

Notes: *** and ** denotes statistical significance at the 1% and 5%, levels, respectively. The result suggests a rejection of the null hypothesis that stock returns in the respective countries does not have explosive patterns.

vestors to be cautious in their investment decisions in oil-exporting markets.

IV. Conclusion

The study examined stock bubbles in major oil-exporting countries using a univariate approach. It examines explosive patterns in stock returns of the selected countries at an individual level. In addition, a panel analysis of the countries was carried out to have a bloc assessment of the selected stock markets. The deflation of irrationally induced exuberances in the stock market could have severe consequences on the overall stability of the financial market and the economy at large. The paper presents evidence of explosive dynamics in the most selected stock markets, particularly, the less-diversified ones, such as Venezuela and Nigeria. We show that as an oil-exporting bloc, the panel results of stock returns equally show price bubbles. These bubbles were positive in most of the periods, but slightly negative, mainly during the COVID-19 period (Huang & Wang, 2024). The paper reveals the need for continued efforts towards economic diversification (see Abdou et al., 2024; Ben-Douissa & Azrak, 2023) from oil to serve as a buffer for economies adversely impacted by oil price swings.

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