Оригинальная статья / Original article

Oil prices, return on financial assets and economic confidence in Russia, India and China

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Abstract

Aim. To study the effect of oil price on stock returns and economic sentiment in Russia, India and China from January 2000 to December 2022.

Objectives. To review publications in the context of the research topic, draw key conclusions and identify gaps and shortcomings, reflecting them in a table; to identify variables at the heart of econometric calculations; to present empirical results based on econometric models.

Methods. The study of the relationship between oil prices, stock returns and economic confidence in Russia, India and China was conducted using reliable and relevant data. The data frequency is monthly, covers the period from January 2000 to December 2022 and includes oil prices, stock market indices and economic confidence indices. The authors applied the econometric models MSIAH(3)-VARX(3) and MSIA(3)-VARX(3).

Results. Oil prices have a significant impact on stock returns as well as economic sentiment in the three countries under study. It is found that for China and India, oil prices affect economic sentiment as well as market returns, but for Russia, the above factors are influenced by different regimes, thus demonstrating that Russia is among the leading oil exporting countries.

Conclusions. The results obtained in the paper are useful for investors and policy makers as they demonstrate the existence of regime-dependent effects and suggest that this information is important when designing economic policies or investment plans. The paper emphasizes the importance of oil price in determining economic and financial conditions in key emerging markets.

Keywords: *oil prices, stock returns, economic confidence, China, India, Russia, regime change models*

Цены на нефть, доходность финансовых активов и экономическая уверенность в России, Индии и Китае

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Аннотация

Цель. Изучение влияния цены нефти на доходность акций и экономические настроения в России, Индии и Китае с января 2000 г. по декабрь 2022 г.

Задачи. Провести обзор публикаций в контексте темы исследования, сделать ключевые выводы и выявить пробелы и недостатки, отразив их в таблице; определить переменные показатели, находящиеся в основе эконометрических расчетов; представить эмпирические результаты, основанные на эконометрических моделях.

Методология. Изучение взаимосвязи между ценами на нефть, доходностью акций и экономической уверенностью в России, Индии и Китае проведено с использованием достоверных и релевантных данных. Частота данных — ежемесячная, охватывает период с января 2000 г. по декабрь 2022 г. и включает в себя цены на нефть, индексы фондового рынка и индексы экономической уверенности. Авторами применены эконометрические модели MSIAH(3)-VARX(3) и MSIA(3)-VARX(3).

Результаты. Цены на нефть оказывают существенное влияние на доходность акций, а также на экономические настроения в исследуемых трех странах. Обнаружено, что для Китая и Индии цены на нефть влияют на экономические настроения, а также на доходность рынка, но для России вышеуказанные факторы зависят от различных режимов, демонстрируя тем самым, что Россия входит в число ведущих стран-экспортеров нефти.

Выводы. Полученные в статье результаты полезны для инвесторов и политиков, поскольку они демонстрируют существование эффекта, зависящего от режима, и предполагают, что эта информация важна при разработке экономической политики или инвестиционных планов. В работе сделан акцент на важности цены нефти при определении экономических и финансовых условий на ключевых развивающихся рынках.

The relationship between oil prices and stock market fluctuations has received a lot of attention in the academic community and among practitioners. The study goes into the relationship between oil prices, economic confidence and stock returns within the context of three major emerging economies: China and with presence in India and Russia. This is the reason why this study is important because these countries are important players in the international economy apart from being big consumers and producers of oil they are also key players in the global financial systems.

As it has been effectively documented, oil prices have significant fluctuations that affect the economy as well as investor confidence. Volatility of oil prices may depict an indication of uncertainty in stock market prices hence affects the confidence of investors and the economy as a whole. Previous studies by Mensi et al. [1] have identified the impressive spillovers between oil prices and stock sectors in the Chinese Market that show the multifaceted interconnections from the GFC till the COVID-19 pandemic.

China, India and Russia are selected based on the consideration of the fact that they have unique features and play a major role on of the global oil market. The Chinese economy, which is the largest importer of oil to the global market, demonstrated a high correlation between oil price volatility and economic sentiment according to Li and Ouyang [2]. India is another nation that is being affected significantly mainly by its steadily growing economy which has significant implications and opportunities in oil importation. Russia, as an exporter of crude oil, is interesting for comparison because there is a direct dependence of its economic stability and stock market on changes in oil prices.

General goals of the study: First, it seeks to examine the effects that direct changes in oil prices have on the returns on stocks of the selected countries. Secondly, it wants to extend the analysis to the effect of oil prices on economic confidence indicators and further investigate how the investor optimism is affected by oil prices.

Thirdly, the study aims at also attempting to analyze the differential effect of oil price shocks in the economies of China, India and Russia to arrive at a holistic understanding of how these economies are likely to behave.

In order to achieve these objectives, this study utilizes methods such as the Markov the *Markov Switching Vector Auto-Regressive (MS-VAR)* and *MS-Granger Causality (MS-GC)*. These models are ideal for decomposing non-linear structures of the paths and broken-

line structures to understand the connection of oil price volatility and economic indicators. Monthly data on oil prices, stock market returns and economic sentiment index for the period from May 2000 to September 2017 were analyzed within the study. Their application enables greater precision in examining the direct and indirect dependencies of variables with one another with time and space.

Let us take a closer look at how this paper is organized. After this brief background information, the second section of the paper presents a review of literature on the topic with emphasis on important studies conducted in the area and gaps observed in the literature that actually formed the basis of this study. The third section describes the data used in the study, and econometric technique used in this research. The fourth section is the empirical evidence, and the fifth section is the discussion of the findings. The last part restates the paper findings and the conclusion and suggests ways to advance the research and the potential implications.

In spite of many studies on the link between stock market returns and oil prices, it is still a multifaceted and ambiguous problem in the case of emerging economies, including China, India, and Russia. The current literature review integrates the findings of ten studies conducted in the last five years to present the emerging knowledge profile, to stipulate the research lacunae, and thus pave the way for the present study.

According to the study conducted by Ghedira and Nakhli [3], the researchers came up to the conclusion of the lead-lag dynamics between oil prices and the stock markets in China and Russia caused by the US financial shocks leading to global financial linkages. According to the study conducted by Kilic and Cankaya [4], they established that oil prices have both direct and indirect impacts on the economic activity in both the BRICS and G7 countries. Their study should therefore be used to encourage more analysis of the global economic interconnectivity when analyzing the effects of oil price on the world economy.

Hashmi, Chang, and Bhutto [5] aimed at exploring the nonlinearities with respect to oil prices and stock market prices applied the quantile autoregressive distributed lag (QARDL) technique. According to their findings, they show that there are large short term and long-term bilateral asymmetries in both oil exporting as well as oil importing

countries like Russian federation and India. Analyzing cross-spreads, Costola and Lorusso [6] investigated commodity energy and Russian stocks. They discovered that there is a considerable influence of oil prices on stock in Russia, which implies that the energy commodities are fundamental to financial performance of oil-reliant economies. Nida et al. [7] analyzed the effects of the Russian invasion of Ukraine on ASEAN's stock markets under the event study method. Based on their conclusions, it is possible to state that geopolitical factors have a highly critical impact on stock market trends, which can be potentially useful in determining the scope of the economic consequences of oil price fluctuations in politically instable areas.

In He et al. [8], the authors examined the oil price uncertainty and the stock markets' risk and return characteristics in the oil-importing and oil-exporting nations. Their main conclusion — heightened volatility in the price of oil results in a lower return on the stock markets and higher risk premium underlining the importance of sound the global markets risk management. Using SVAR model, Sarmah and Bal [9] came up to the conclusion that international oil price changes influence significantly on the macroeconomic balance of oil importing nations such as India. In his study, Lu et al. [10] found that oil price fluctuations affect stock market volatility with magnified impact on the emerging markets, particularly China.

Chen, Zhu, and Li [11] applied a new model of time-varying analysis and studied the pass-through effects of the oil price shocks on China. The results of the research show the mixed and profound effect on inflation and the stock markets of oil price shocks. Siddiqui, Mahmood, and Margaritis [12] in their work titled, "Asymmetry and speed of adjustment in stock markets of GCC and oil importing countries" explain the asymmetry and speed of adjustment in the same. They observed that the asymmetry of the causality of the stock returns also operates at different rates of speed depending on the markets under consideration. A summary of the literature review is presented in Table 1.

Credible and relevant data form the basis for the analysis that is focused on the relationship between oil prices and stock returns and economic confidence in the three countries. The abovementioned indicators are presented at monthly intervals for the period

Table 1

Literature review

Таблица 1. Литературный обзор

Authors	Period	Country/ Region	Focus of Study	Key Findings	Research Gap Identified
Ghedira & Nakhli (2023)	2000–2022	Russia, China	Dynamic causality between oil prices and stock markets	US financial instability significantly influences the oil-stock relationship	Role of geopolitical events
Kilic & Cankaya (2020)	2000–2019	BRICS, G7	Oil prices and economic activity	Oil prices have direct and indirect effects on stock returns	Comparative analysis required
Hashmi et al. (2021)	1990–2020	Oil-exporting and oil-importing countries	Asymmetric effects of oil prices on stock markets	Significant short-term and long-term asymmetries in oil-exporting and oil-importing countries	Non-linear and asymmetric effects
Costola & Lorusso (2022)	2000–2020	Russia	Spillovers among energy commodities and Russian stock market	Fluctuations in oil prices significantly affect the Russian stock market	Impact of energy commodities on financial stability
Nida et al. (2023)	2022	ASEAN	Impact of Russian-Ukraine invasion on ASEAN stock markets	Geopolitical events significantly influence stock market behavior	Broader economic impacts of oil price shocks
He et al. (2022)	2000–2020	Oil- and exporting countries	Oil price uncertainty and stock market risk-return relation	Increased oil price uncertainty leads to higher risk premiums and lower stock returns	Robust risk management strategies
Sarmah & Bal (2021)	2000–2020	India	Effect of crude oil prices on inflation and economic growth	Oil price fluctuations significantly impact macroeconomic stability	Impact on specific emerging markets
Lu et al. (2021)	2000–2020	Global	Effect of oil shocks on stock market volatility	Oil price shocks have a pronounced effect on stock market volatility	Transmission mechanisms of oil price changes
Chen et al. (2020)	2000–2020	China	Pass-through effects of oil price shocks on China's inflation	Oil price shocks have significant and varying impacts on inflation	Time-varying effects on stock market performance
Siddiqui et al. (2020)	2014–2016	GCC, Oil-importing countries	Asymmetries and speed of adjustment in stock markets during oil price slump	Oil price shocks have asymmetric effects on stock returns with varying speeds of adjustment	Speed of adjustment in different markets

Source: created by the authors.

from the beginning of January 2000 to the end of December 2022.

1. Oil Prices: The data on the oil and its prices prevailing in the international market was collected from the US Energy Information Administration (EIA).

2. Stock Market Indices: Secondary data was collected from Bloomberg to obtain the market indices of China, India and Russia. In more detail, the Shanghai Stock Exchange Composite Index (SSE) for China, the Bombay Stock Exchange Sensex (BSE) for India, and the Moscow Exchange Index (MOEX) for Russia were used in this study. These indices can be viewed as general and changes of its national stock market [2].

3. Economic Confidence Indices: The economic confidence index was collected from Organisation for Economic Co-operation and Development (OECD) through their online database. They illustrate consumers and businesses' sentiments to the economic factors, which is useful while studying investors' behaviour and dynamics in the markets.

Advanced Econometric Analysis of Oil Prices, Stock Returns, and Economic Confidence

As for the method of analysis that is used in order to find the inter-dependency between the oil prices, the stock returns and the economic confidence index, this study relies on VAR models and Markov Switching VAR models as well.

1. Vector Auto-Regressive (VAR) Model

VAR model is used as an analytical tool to relate two or more series which are time related such as prices of oil, stock market indices and economic confidence indices. The model is structured as follows: $Y_t = \Phi_0 + \Phi_1 Y_{t-1} + ... + \Phi_p Y_{t-p} + \mathcal{E}_t$ where Y_t represents the vector of endogenous variables at time t, Φ_0 is the intercept, $\Phi_1, ..., \Phi_p$ are the

Table 2

Analytical techniques and data

Таблица 2. Аналитические методы и данные

Technique	Purpose	Variables Involved
VAR Model	Capture linear interdependencies among time series variables	OIL, SMI, ECI
MS-VAR Model	Account for regime changes and non-linear dynamics	OIL, SMI, ECI
Granger Causality Tests	Determine direction of causality between variables	OIL, SMI
IRFs	Trace impact of shocks to one variable on others	OIL, SMI, ECI

Source: created by the authors.

coefficients which are used in autoregressive technique and $\mathcal{C}_t$ is the error term.

2. Markov Switching VAR (MS-VAR) Model

As in any empirical application, due to the possibility of a regime shift (e.g., during financial crises and high fluctuations in oil prices), to account for this reality, the MS-VAR method is employed. The VAR part in MS-VAR model is $Y_t = \mu s_t + \Phi_1(s_t)Y_{t-1} + \ldots + \Phi_p(s_t)Y_{t-p} + \mathcal{C}_t(s_t)$ where s_t is the regime state at time t, which follows a Markov process with transition probabilities $P(s_t = j/s_{t-1} = i)$. The parameters $\mu s t \Phi_1(s_t), \ldots, \Phi_p(s_t)$, and the covariance matrix of the error term $\mathcal{C}_t(s_t)$ are regime-dependent.

Example Calculations:

Assuming a simple two-regime model (Recession and Expansion), the transition probabilities might be estimated from the data as follows:

- P_{11} (probability of staying in Recession) = = 0.8
- P_{22} (probability of staying in Expansion) = = 0.9
- The regime-dependent autoregressive parameters for an oil price series in the VAR(1) model might look like this:
- Regime 1 (Recession): $\Phi 1^{(1)} = 0.5$
- Regime 2 (Expansion): $\Phi 1^{(2)} = 0.2$

These factors suggest that in a recession spent on oil remains high longer than when there is an expansion, investment returns and economic confidence, and are generally affected.

3. Granger Causality Tests

The specific objective of Granger tests is to determine if high oil prices in the past cause low stock returns in the future. Oil prices are a significant variable that Granger causes stock returns if the calculated F-statistics are huge [13].

Definition of Variables and Rationale

The variables included in the analysis are carefully selected to capture the essence of the research question:

Oil Prices (OIL): Expressed by the monthly average of the Brent crude oil price. Oil prices are a key variable for many industries and have a direct impact on stock market indexes and business and consumer confidence.

Stock Market Indices (SMI): This includes the Shanghai Stock Exchange Composite Index (SSE) for China, the Bombay Stock Exchange Sensex (BSE) for India, and the Moscow Exchange Index (MOEX) for Russia. These indices represent the average and relative risk of the stock markets of the countries in question, thus giving a good picture of the markets.

Economic Confidence Indices (ECI): These indices refer to the extent of positive or negative sentiment that consumers and business have towards the performance of their country's economy. They have positive association with consumer expenditure and investment while low confidence affects economic activities [14]. The integration of ECI assists in determining the impact of changes in oil price on other aspects of the economy.

The proximity to the topic of the study makes the selection of the variables justified. Crude oil prices are closely connected to the cost of production and by extension, returns on stocks. Stock market indices are used to measure the well-being of the stock market and therefore the economy while on the other hand economic confidence indices act as indicators of economic sentiment giving clues on how oil price fluctuation might affect the economy. The relationship between analytical techniques and data is presented in Table 2.

Presentation of the Empirical Findings

Hence, the empirical findings of this study are based on the MSIAH(3)-VARX(3) models for China and India and the MSIA(3)-VARX(3) model for Russia. These models were chosen because of their capacity to capture the regime-switching and the dynamic as-

Table 3

Unit Root and Johansen Cointegration Test

Таблица 3. Единичный корень и тест Йохансена на коинтеграцию

Country	Variable	PP Test	ERS Test	Johansen Cointegration Test
China	lopt	−1.369	0.1169	$r = 0$: 18.04, $r \leq 1$: 9.55, $r \leq 2$: 1.67
	dlopt	−10.856	7.856	
	lbct	−1.023	0.0389	
	dlbct	−4.856	5.896	
	lsrt	−1.236	0.304	
	dlsrt	−8.369	6.896	
India	lbct	−1.496	0.6141	$r = 0$: 27.96, $r \leq 1$: 14.23, $r \leq 2$: 2.788
	dlbct	−4.986	7.012	
	lsrt	−2.085	0.945	
	dlsrt	−11.326	6.056	
Russia	lbct	−2.012	0.212	$r = 0$: 28.11, $r \leq 1$: 11.08, $r \leq 2$: 2.11
	dlbct	−10.856	5.236	
	lsrt	−1.896	0.0459	
	dlsrt	−11.569	−11.569	

Source: created by the authors.

Table 4

MSIAH(3)-VARX(3) Model for China

Таблица 4. Модель MSIAH(3)-VARX(3) для Китая

Regime	Variable	Coefficient	Standard Error
Regime 1	dlbc	1.3898 (0.0094)	0.0019
	dlsr	0.0055 (−0.6373)	0.0323
Regime 2	dlbc	1.6919 (0.8991)	0.0386
	dlsr	0.0004 (0.0807)	0.0239
Regime 3	dlbc	1.5197 (5.0727)	0.0018
	dlsr	0.0018 (0.2388)	0.0260

Source: created by the authors.

sociations between oil prices, stock returns and economic confidence.

Unit Root and Johansen Cointegration Test Results

As a preliminary step of the analysis, we applied the augmented PP and ERS tests for unit root and the Johansen cointegration tests to determine the stationarity and cointegration of the data. The findings are presented in the following Table 3.

The evidence shows that the variables are stationary in first difference which means that they are I(1) and possess a unit root. The Johansen cointegration analysis indicates that there is no cointegration in the variables, and therefore first differences or innovations could be used in the MS-Granger causality analysis [15].

MSIAH(3)-VARX(3) Model for China

Analyzing the MSIAH(3)-VARX(3) model for China, the authors found evidence of regime switching concerning oil prices, stock returns, and economic confidence. The results of the regime probabilities and the parameter estimates are shown in the following Table 4.

The findings of the research show that oil price change indeed influences stock return and economic sentiment in all the regimes. A high probability of remaining in the same regime means that the exercise is likely to have persisting impacts.

MSIAH(3)-VARX(3) Model for India

Likewise, while using the MSIAH(3)-VARX(3) model for India, there are highly significant and distinct regime-dependent interactions (Table 5).

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Table 5

MSIAH(3)-VARX(3) Model for India

Таблица 5. Модель MSIAH(3)-VARX(3) для Индии

Regime	Variable	Coefficient	Standard Error
Regime 1	dlbc	2.2296 (27.0254)	0.0002
	dlsr	0.0034 (−0.2877)	0.0353
Regime 2	dlbc	2.0824 (2.4861)	0.0001
	dlsr	0.0001 (−0.0439)	0.0228
Regime 3	dlbc	1.4079 (4.6991)	0.0001
	dlsr	0.0029 (−0.0909)	0.0170

Source: created by the authors.

Table 6

MSIAH(3)-VARX(3) Model for Russia

Таблица 6. Модель MSIAH(3)-VARX(3) для России

Regime	Variable	Coefficient	Standard Error
Regime 1	dlbc	−0.1460 (2.6058)	0.0006
	dlsr	0.0084 (−0.3801)	0.0273
Regime 2	dlbc	1.0979 (−0.1684)	0.0006
	dlsr	−0.0008 (−0.1578)	0.0273
Regime 3	dlbc	1.1362 (−1.5495)	0.0006
	dlsr	0.0018 (0.0152)	0.0273

Source: created by the authors.

This paper focuses on the influence of oil prices on stock returns and economic confidence in India in different regimes.

MSIA(3)-VARX(3) Model for Russia

For Russia, the estimates from the MSIA(3)-VARX(3) model are as follows (Table 6).

The findings show that regime dependent relationship between oil prices and stock returns and economic sentiment prevails. The transition probabilities indicate a different level of fluctuations in the two regimes.

The results obtained through the empirical analysis show positive effects of oil price shocks on stock returns and economic optimism in China, India, and Russia. The regime-switching models take account of the non-linear and asymmetrical character of the relatons since the effects differ under different economic conditions.

What is more, Chinese oil prices are found to exert significant and persistent influences on stock returns as well as economic confidence across all distinct regimes. This implies that any changes in oil prices are likely to have effects on the economic outlook and market conditions in China. Similar trend is observed in the India where the oil price shocks have a strong and significant impact on the stock returns and economic sentiments [16]. The cross contemporaneous causality between stock returns and economic confidence in India implies that the two variables in the System are much more intertwined, thus depicting the growing interdependent nature of the Indian economy and the local stock market. Based on the results obtained, it can be deduced that oil price has significant impacts on stock returns and economic confidence and that the impacts vary as a result of different regimes in Russia [17]. First regime was characterized by the presence of bidirectional causality, which shows how vulnerable the Russian economy is to changes in oil price since Russia is an exporter of oil.

The findings of this research conform and build on the current literature on oil prices, stock performance, and consumers' optimism. Ghedira and Nakhli [3] as well as Kilic and Cankaya [4] have identified that oil prices play devastating impacts on the financial markets and economic growth. These hypotheses are supported by our results and point out that these effects remain regime-sensitive, especially in the case of China, India, and Russia considered as emerging markets.

In China, evidence from the regression of oil prices on stock returns and economic confidence for all the three regimes therefore confirms the importance of energy prices in the direction of market and economic confidence. Thus, this fact is similar to the findings of Mensi et al. [1], who revealed strong spillovers in the relations between oil prices and Chinese stock sectors. While the bidirectional Granger causality between stock returns and economic sentiment is indicative of a more interconnected and sensitive structure in the case of India is consistent with the broader macroeconomic effects of oil price as observed by Sarmah & Bal [9]. The variations in the effects across different Russian regimes provide insights to an oil-exporting economy's characteristics, as observed by He et al. [8].

The implication of these findings is that investors and policymakers get to make informed decisions. Regime-dependency analysis of oil price changes can help the investors in their portfolio management especially in the current world full of more uncertainties. The authorities in China, India, and Russia can benefit from these findings to strengthen their economic policies decreasing the impact of oil price fluctuations on financial systems and public confidence. When these variables and their relationships are fully understood, the authorities are in a position to apply the right manoeuvre to stabilise their economies during cycle of oil price volatility and enhance investor confidence.

The findings of the research show the influence of the oil prices affect to stock returns and economic sentiment in India, China and Russia. They are associated with financial markets and its sentiments in a manner that their impacts are moderated by specific regimes. These findings suggest that they are regime-dependent, something that is beneficial for investors and policymakers to understand. The authors should conduct a similar study in the future to examine the moderation effect of other macroeconomic variables such as exchange rate and interest rate on the relationship between oil prices and stock market performance. However, analyzing these interactions in conjunction with the impact of geopolitical factors and instability of the financial markets could enhance the comprehension of these trends even more.

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