# Theoretical and Practical Research in Economic Fields

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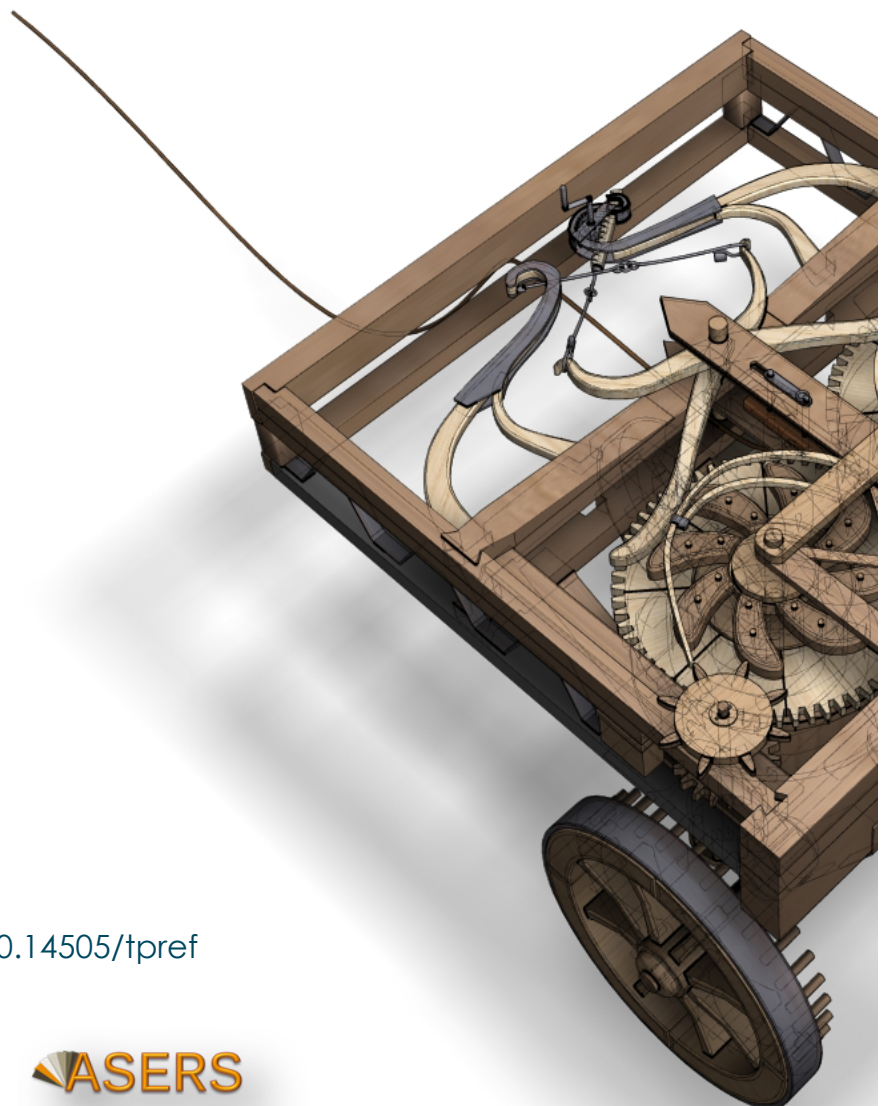# *Table of Contents*

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# Echoes of Conflict: Unveiling the Interconnected Tapestry of Russia-Ukraine Warfare, Oil Price Ballet, and the Asian Stock Symphony

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**Abstract:** The purpose of this research is to look into the impact of the Russia-Ukraine war on the relationship between oil prices and the Asian stock market. While earlier studies have investigated the impact of oil prices on stock markets, there has been little research into the impact of crude oil prices on the Asian stock market in the context of the Russia-Ukraine war. For this purpose, the data is collected from NSE and Bloomberg database the study's findings imply that the Russia-Ukraine war has had a major impact on the relationship between crude oil prices and stock market indices in numerous Asia-Pacific countries. The study suffers from a few limitations such as it only examines the relationship between crude oil prices and stock market indices but there are other macroeconomic factors, such as interest rates, inflation, and political instability which also affect the market.

## Introduction

Oil is one of the most crucial sources of energy and is frequently used as an important measure of economic stability due to the country's reliance on oil items. Numerous theories and academic articles have highlighted the impact of oil price fluctuations on economic fluctuations, both theoretically and empirically. It is considered a global shock with the potential to simultaneously affect multiple economies. (Kling, 1985) for example, concluded that crude oil price increases are associated with stock market declines. Chen *et al.* (1986), in contrast, suggested that oil price changes have no effect on asset prices. Jones and Kaul (1996) reported a stable negative relationship between oil price changes and aggregate stock returns. Huang *et al.* (1996), however, found no negative relationship between stock returns and changes in the price of oil futures, and Wei (2003) concluded that the decline in U.S. stock prices in 1974 cannot be explained by the 1973–1974 oil price increase.

On theoretical grounds, oil price shocks affect stock market prices or returns through their effect on expected earnings. On the other hand, the stock market is often considered as a barometer of a nation's economic well-being. If the stock prices plummet, it can cause significant economic disruptions worldwide by reducing household income. This, in turn, may lead to a decrease in consumer spending, as investors become more cautious due to their losses in the stock market. As a result, it may become challenging for companies to raise capital by issuing more stocks due to the lower stock prices. Over the last few years, the stock market and crude oil markets have developed a mutual relationship, with virtually every production sector in the global economy relying heavily on oil as an energy source. Crude oil prices are expected to have a significant impact on the manufacturing sector.

The stock market plays an important role in a country's growing industries and commerce, which eventually affects the economy. Crude oil is a commodity that is in high demand all over the world. Any change in crude oil prices can have an immediate and indirect impact on the economies of the various countries. The volatility of crude oil prices drove many businesses away, affecting the stock market as well. An increase in the price of oil causes a temporary decrease in total output because investors postpone business activities due to rising oil prices (Do, 2022).

Previous economic studies show that understanding the fundamentals of supply and demand in the oil market is critical for understanding short-run and long-run fluctuations. These fundamental changes, in particular, provide more pricing information for investors/producers to determine which investments are profitable. One of the most significant events that led to a significant increase in crude oil prices was the 1973 oil crisis. This was triggered by the Organization of Arab Petroleum Exporting Countries (OAPEC) imposing an oil embargo on countries that supported Israel during the Yom Kippur War. This caused a sharp rise in crude oil prices and led to a global recession. The stock market experienced significant declines, with the S&P 500 falling by about 30% over the next two years. Another event that affected crude oil prices and the stock market was the 1990 Gulf War. The war led to a brief but significant increase in crude oil prices, with Brent crude oil reaching a high of $40 per barrel. The stock market was also impacted, with the S&P 500 falling by 17% during the first six months of the conflict.

**On 24 February 2022, Russia invaded Ukraine in a major escalation of the Russo-Ukrainian War.**

One immediate impact of the Russia-Ukraine conflict on crude oil prices is the threat of supply disruption. Ukraine is a key transit route for Russian oil and gas exports to Europe, with about 40% of Europe's natural gas imports coming from Russia via Ukraine. Any escalation of the conflict, including the possibility of a Russian invasion of Ukraine, could lead to disruptions in the supply of Russian oil and gas to Europe, leading to a spike in crude oil prices.

Several studies have investigated the impact of the Ukraine-Russia war on stock market returns. Gęstwa and Kudła (2018) used an event study approach to analyze the impact of the Ukrainian conflict on the stock markets of 13 European countries. They found that the war had a negative impact on the stock markets of these countries, with the largest effects observed in Russia, Poland, and Germany. Similarly, Zolotareva, Kuga and Nazarova (2019) examined the impact of the Ukraine-Russia crisis on the stock markets of Russia, Ukraine, and the United States. They found that the conflict had a negative impact on stock market returns in all three countries, with the effect being most pronounced in Russia.

In contrast, some studies have found that the impact of the Ukraine-Russia war on stock market returns has been limited. For example, Fidrmuc, Tresl and Senaj (2018) examined the impact of the conflict on the stock markets of eight Central and Eastern European countries. They found that the war had a limited impact on stock market returns, with the effects being confined to a few days surrounding the escalation of the conflict. Similarly, Li and Li (2020) analyzed the impact of the conflict on the stock markets of Russia and Ukraine. They found that

the war had only a short-term impact on stock market returns and that the effects were not significant in the long run.

Furthermore, some studies have investigated the transmission channels through which the Ukraine-Russia war affects stock market returns. For example, Gęstwa and Kudła (2018) found that the conflict had a negative impact on the oil and gas sector in the affected countries, which in turn affected the stock market returns of these countries. Similarly, Zolotareva *et al.* (2019) found that the conflict had a negative impact on the banking sector, which in turn affected the stock market returns of Russia and Ukraine. The extensive research available on the subject only investigated the impact of the Russia-Ukraine war on the stock market, and crude oil prices of the various countries or industries and concluded a negative impact but to the best of the author's knowledge no research has been done on investigating the interconnection tapestry of Russia Ukraine warfare, crude oil prices in Asian stock market

These historical events highlight the complex relationship between crude oil prices and the stock market. In general, a sharp increase in crude oil prices can lead to reduced corporate earnings and slower economic growth, while a sharp decrease in crude oil prices can have a positive impact on economic activity and corporate earnings.

A study by the International Monetary Fund (IMF) found that a $10 per barrel increase in oil prices can lead to a 0.2% reduction in global economic growth in the short term, with a more significant impact in oil-importing countries. This, in turn, can lead to lower corporate earnings and a decline in stock prices. Crude oil prices ranged from $73 to $132.3 at their peak between 2000 and 2008, before plummeting to $39.95 following the subprime loan crisis. When the global economy recovered from the crisis, crude oil prices soared to more than $100 per barrel in 2011. Nonetheless, it fell to 26.68 in 2016, the lowest ever. Until now, the price of crude oil has risen to more than $70. As a result, the fluctuation in the price of oil affects asset prices and increases volatility, which has a direct impact on the financial market.

The overall effect of rising oil prices on stock prices is determined by whether a company is a consumer or producer of oil and oil-related products. Because there are more companies in the world that consume oil than produce it, rising oil prices are expected to have a negative impact on stock markets (Basher & Sadorsky, 2006). The theoretical underpinning for the relationship between oil price and stock returns reflects that oil prices can directly affect stock market by impacting future cash flows or indirectly through an impact on the interest rate used to discount future cash flows (Salisu and Oloko, 2015).

Hammoudeh and Yuan (2008) found that crude oil prices had a significant impact on stock market returns in major oil-importing countries such as Japan, South Korea, and Taiwan. They observed that the stock prices of oil-refining companies in these countries were negatively affected by rising oil prices, while the stock prices of oil-extracting companies were positively affected. Similarly, Li and Chen (2018) studied the impact of crude oil prices on stock returns in China and found that oil prices had a significant impact on the stock prices of energy-related companies. They also observed that upstream companies in China, such as PetroChina and Sinopec, tended to benefit from rising oil prices while downstream companies, such as China Petroleum & Chemical Corporation, tended to suffer.

These findings are consistent with the idea that there are upstream and downstream companies that may be affected in opposite ways by changes in crude oil prices. As a result, the overall impact of crude oil prices on the stock market may be balanced out to some extent. The impact of extreme events on crude oil markets is critical in crude oil price analysis because these events generally have a large impact on crude oil markets (Zhang, 2009).

Several studies for Asian countries such as Malaysia, India, China, and Pakistan have been conducted to assess the relationship between oil price and stock market (Bani and Ramli, 2019; Echchabi and Azouzi, 2017; Jebran et al., 2017; Ekong and Ebong, 2016). Sharma *et al.* (2018) investigates the link between crude oil prices and the Indian stock market. Russia and Ukraine account for less than 2% of global trade, but they control a significant portion of many commodities, including 37% of global palladium supply, 17% of natural gas supply, 13% of wheat supply, and 12% of oil supply (Goel, 2022).

To address this literature gap, this study aims to explore link between oil prices and emerging Asian stock markets particularly during Ukraine and Russia War of 2022.

The Russia-Ukraine conflict has been a major source of instability in the crude oil market, and its effects can be felt across the world. The conflict has led to disruptions in the supply of crude oil, which in turn has led to fluctuations in crude oil prices. This volatility in energy prices has had a direct impact on the Asian stock market, as many companies in the region are heavily dependent on crude oil.

Oil prices had a significant impact on Asia-Pacific stock returns following the global financial crisis, with Indian stock returns being the most dependent on crude oil prices. The relationship between oil prices and Asia-Pacific stock prices is generally weak. (Hui-Ming Zhu, 2013). The Russia-Ukraine crisis is about to drive up prices even further. The South Asian market is one of the largest consumers of crude oil and petroleum products. For example, after the United States, China, and Japan, India is the fourth-largest net importer of crude oil and petroleum products. Furthermore, India currently imports more than 70% of its crude requirements, and this dependence could rise to 90% due to limited supply and stagnant domestic production (Ghosh and Kanjilal, 2016). Similarly, Pakistan and Sri Lanka import massive amounts of crude oil and related products.

According to Naranpanawa and Bandara (2012), Sri Lanka's expenditure on petroleum imports increased by approximately 39.3 percent in 2010 (an increase in expenditure on oil imports from US$ 2.2 billion in 2009 to US$ 3 billion in 2010). Oil import expenditures account for one-third of Pakistan's total import bill. Oil is an important commodity in this region because all of these countries primarily produce agricultural products, and various sectors such as industry, transportation, and agriculture rely heavily on crude oil. Thus, oil price shocks appear to have a significant impact on the economies under consideration. As a result, it is critical to investigate the dynamic relationship between global oil prices and the stock returns of the selected emerging markets. An increase in the price of oil puts downward pressure on foreign exchange rates while pushing up domestic inflation rates in these countries (Ha-Le & Chang, 2011).

The Russia-Ukraine war will have far-reaching economic consequences for Asian economies, as Russian energy is the region's primary driver of economic growth. The Southeast Asian region, particularly the Association of Southeast Asian Nations, does not have direct economic links with Russia; however, there has been a surge in commodity prices, particularly oil, which has become relatively expensive, thereby augmenting producer and consumer price inflation in the region.

This study aims to examine the impact of the Russia-Ukraine war on the relationship between oil prices and the Asian stock market. While previous studies have investigated the impact of oil prices on stock markets, there is limited research that focuses specifically on the impact of crude oil prices on the Asian stock market in the context of the Russia-Ukraine war. This study seeks to contribute to this field of research by conducting an in-depth analysis of the relationship between crude oil prices and the Asian stock market during the war.

According to Lee and Zeng (2011), the degree of dependence between oil prices and stock returns increases during bearish and bullish periods. As a result, we investigate the extreme dependence between crude oil prices and stock returns in the Asia-Pacific region in our research. The study will help in analysing the effect of this war on the Asian Stock market, which in turn will base our understanding of its effect on the national economy and long-term effects of the war.

## 1. Literature Review

Sahu and Mondal, D. (2014) concluded in their study that there is a positive long-run relationship between oil prices and the movement of stock market indices, though crude oil prices have no significant causal effect on the Indian stock market. The evidence from this study provides a comprehensive understanding of the dynamic relationship between the oil price and the Indian stock market. Bagchi, B. (2017b), analysed the dynamic correlation between stock markets in emerging economies, specifically in BRIC (Brazil, Russia, India, and China) countries, and crude oil price volatility, particularly in the context of the continuous sharp decrease in crude oil prices. Positive and negative shocks have different effects on volatility in the BSE Sensex and crude oil, and returns and volatility are negatively correlated, suggesting that bad news will increase volatility. Utilising an event study methodology, (Küçükçolak, *et al.* 2024) examined how the Russia-Ukraine situation has affected energy businesses listed on European, Asian, and American stock exchanges demonstrating how fear and market responses to rising tensions caused the war to result in positive anomalous returns in Asian and European markets. In contrast, American energy corporations held steady throughout the same time frame. Furthermore, the markets promptly took into account Russia's declaration of selling natural gas in Rubles, demonstrating a proficient adjustment in stock values.

Hashmi, *et al.* (2021), talks about the short- and long-term effects of oil prices in the context of bullish, bearish, and normal stock market conditions in countries that export and import oil, with oil exporting nations including Russia, Mexico, Venezuela, and Norway and oil importing nations including India, China, Japan, and Norway. Mbah, R. E., & Wasum, D. 2022 claimed that the goal of the international financial sanctions on Russia is to destroy its economy and discourage more attacks on Ukraine, but they also have an effect on the world economy as a whole. Oil, petrol, and food prices are driving up inflation, causing supply chain disruptions, and driving up energy costs in sanctioned nations including the U.S., the UK, Canada, and the EU. Also natural

disasters and geopolitical risk factors exhibit a moderate level of connectedness with stock returns (Vuković, D. B., *et al.* 2023). Ozili, P. K. (2024) study reflects that Russia-Ukraine war led to rising prices including rising energy prices and commodity prices and a rise in food prices, thereby leading to a rise in global inflation. Behera, Chinmaya (2023) study also confirmed the presence of volatility transmission among the stock returns and oil prices. The study by Palash Bairagi, 2014 showed that over the long run, oil prices typically follow supply and demand economic fundamentals. Noor, H., & Dutta, A. (2017), investigated the volatility relationship between the global oil market and the major South Asian equity markets. They find no significant evidence of volatility transmission from equity markets to the global oil market, which is not surprising. Aziz, T. (2023) also reflected that volatility does not transmit from global oil prices to the equity markets of the selected SAARC countries. Zou, H., Li, R., & Li, S. (2014) suggested that the use of time-varying copulas can best capture tail dependence and that incorporating tail correlation can enhance the accuracy of Value at Risk (VaR) estimates. Their findings have crucial implications for investors in the Asia-Pacific region seeking to diversify their portfolios, manage risk, and allocate assets internationally.

The conflict between Russia and Ukraine has had a major impact on the world energy market, especially on the price of crude oil. According to Zhang, Qi *et al.* (2024), there is a significant one-way relationship between the war and changes in oil prices; throughout the conflict, WTI and Brent crude prices increased by 52.33% and 56.33%, respectively. Yousaf, I., & Hassan, A. (2019), explored the spillover effects of crude oil on emerging Asian stock markets with regard to returns and volatility and revealed that crude oil price fluctuations had a positive causal impact on the majority of the stock markets under consideration. Gaio, *et al.* (2022), showed that the index's return series exhibits multifractality during times of crisis. The evidence contradicts the market efficiency hypothesis and suggests that asset prices are predictable during times of instability and global financial crisis. The ethnic tension created due to the Russia- Ukraine war led to the long-memory effect on the volatility of Brent crude oil and currency exchange prices (Bagchi, B. 2023). Huang, M., Shao, W., & Wang, J. (2023) examined the impact of the Russia-Ukraine conflict on the crude oil market as well as the stock market chain reaction in importing and exporting countries. The study found that the efficiency of the crude oil market decreased following the Russia-Ukraine conflict, as evidenced by the generalized Hurst exponents, mass exponents, and multi-fractal spectrums. Adekoya, O. B., *et al.* 2022 showed that the connectedness between crude oil prices and other financial assets is stronger during the war compared to before it. The results highlighted the transitory nature of the spillover effect and the importance of understanding the relationship between different markets during times of market turbulence caused by a war. Escribano, A. *et al.* (2023) study also highlighted that during political and financial events anld also in the aftermath of natural disasters have spillover effects on the returns and volatility among crude oil prices and stock markets. Ready, R. C. (2018), findings of their research displayed a strong positive correlation with market returns and economic output, while supply shocks have a strong negative correlation. The negative correlation between supply shocks and returns is strongest in industries that produce consumer goods, while the positive correlation of demand shocks is stronger in industries that use large amounts of oil as an input. Sreenu, N. (2022), indicated a significant negative relationship between crude oil price uncertainty and stock market returns in India. The study finds that an increase in oil price uncertainty leads to a decline in the Indian stock market returns, which suggests that high levels of oil price uncertainty can have adverse effects on the Indian stock market. Alam, *et al.* (2022), studied the relationship between gold and silver with stock prices in Western countries and concluded that such commodities transmitted the most shocks to the United States, Canada, China, and Brazil stock markets during the Russian invasion crisis. This implies that these stock markets were more vulnerable to the crisis than the other commodities/markets studied. Using data from six continents, Chowdhury, E.K. and Khan, I.I. (2023) investigates the initial consequences of the Russia-Ukraine conflict on international stock markets in the first four months following Russia's invasion in February 2022. When the EGARCH models and event study approach are used, substantial volatility is shown, with varying effects on various markets. According to regression study, increasing oil prices have a negative impact on anomalous returns, but growing market volatility (VIX) has a favourable effect.

In study by Boungou and Yatié's (2022), findings showed that the Ukraine-Russia war had a significant negative impact on the stock returns of countries across the globe. The negative impact was most pronounced in Eastern Europe, followed by Asia, the Americas, and then Western Europe. Furthermore, the magnitude of the impact varied across different sectors, with financials, utilities, and energy sectors being the most affected. Li, Alshater, and Yoon's (2022) found in their study that the Russia-Ukraine conflict had a negative impact on stock returns, exchange rates, and commodity prices. The authors noted that the magnitude of the impact varied across different financial markets, with the Russian market being the most severely impacted. Mahunta, R. (2011), investigated the long-term and causal relationship between NSE NIFTY 50 of the National Stock Exchange and

crude oil prices, using econometric techniques within the time frame of January 2010 to December 2014 and the results suggested that the relevant variables act together in the long run, indicating a strong interdependence between the stock market index and crude oil prices.

## 2. Research Methodology

The current study includes unit root tests, correlation analysis, Granger causality tests, and regression analysis. The techniques used for the study on the impact of crude oil prices on the Asian stock market during the Russia-Ukraine war are regression and correlation analysis. The primary data source for crude oil prices will be a reliable and publicly available database, such as the Energy Information Administration (EIA) or the International Energy Agency (IEA). This data will provide information on the daily or weekly prices of crude oil during the period of the Russia-Ukraine conflict and the data on the Asian stock market will be obtained from a reputable financial database, such as Bloomberg, and NSE website. This data will provide information on the performance of the stock market, including stock prices, market indices, and market returns, during the period of the Russia-Ukraine conflict.

The relationship of between stock market indices and crude oil prices is modeled with a linear regression equation

**Hypothesis of the study -**

H1: There is an effect of crude oil price on the performance of Asian stock markets during the Russia-Ukraine war

H2: Crude oil returns Granger cause Asian stock markets during Russia-Ukraine war

H3: There is a long run relationship between crude oil returns and Asian stock market returns during the Russia-Ukraine war

Table 1. The stock market indices used for the study include

| COUNTRY | STOCK INDEX |
|---------|-------------|
| MALAYSIA | BURSA MALAY |
| CHINA | SZSE COMPOSITE INDEX |
| BANGLADESH | DSE 30 |
| INDONESIA | IDX COMPOSITE |
| PAKISTAN | KARACHI 100 |
| SOUTH KOREA | KOSPI |
| PHILLIPINES | PSEI INDEX |
| SINGAPORE | SGX NIFTY |
| TAIWAN | TAIEX |
| THAILAND | SET INDEX |
| VIETNAM | VNI |
| INDIA | NIFTY 50 |
| JAPAN | NIKKEI 225 |

*Source*: author compilation

The study may also use secondary sources, such as academic journals, books, and news articles, to provide additional context and background information. These sources may also provide insights into the broader economic and geopolitical context that may have influenced the relationship between crude oil prices and the Asian stock market during the period of the conflict

## 3. Analysis and Discussion

The results of the unit root test given in Table 2 indicates that the data is stationary at the level, as all countries have a probability value of 0. When the data is stationary, it allows us to use statistical techniques to analyse the relationship between variables over time. Overall, these results provide a good foundation for further analysis of the impact of crude oil price fluctuations on the stock markets of these countries.

Table. 2 Unit Root Test

| Country | At level | | Decision |
|---|---|---|---|
| | T STAT | P VALUE | |
| Malaysia | -15.56 | 0.000 | I(0), Stationary at Level |
| CHINA | -16.07 | 0.000 | I(0), Stationary at Level |
| Bangladesh | -13.45 | 0.000 | I(0), Stationary at Level |
| Indonesia | -14.62 | 0.000 | I(0), Stationary at Level |
| Pakistan | -17.13 | 0.000 | I(0), Stationary at Level |
| South Korea | -15.69 | 0.000 | I(0), Stationary at Level |
| Philippines | -15.64 | 0.000 | I(0), Stationary at Level |
| Singapore | -16.14 | 0.000 | I(0), Stationary at Level |
| Taiwan | -13.28 | 0.000 | I(0), Stationary at Level |
| Thailand | -21.27 | 0.000 | I(0), Stationary at Level |
| Vietnam | -15 | 0.000 | I(0), Stationary at Level |
| India | -15.8 | 0.000 | I(0), Stationary at Level |
| Japan | -15.64 | 0.000 | I(0), Stationary at Level |

*Source*: author compilation

Table 3. Correlation Coefficient

| Countries | Pre-Invasion (Crude Oil) | Post Invasion (Crude Oil) |
|---|---|---|
| Malaysia | 0.150674597 | -0.368048884 |
| CHINA | -0.05204088 | -0.265860548 |
| Bangladesh | -0.12438657 | -0.329636877 |
| Indonesia | -0.1994478 | -0.227549118 |
| Pakistan | -0.09745259 | -0.036312285 |
| South Korea | -0.21618877 | -0.277296399 |
| Philippines | 0.177661558 | -0.047654746 |
| Singapore | 0.15380892 | -0.194135502 |
| Taiwan | -0.10244536 | -0.177426851 |
| Thailand | 0.347940454 | -0.150775315 |
| Vietnam | 0.009319465 | 0.178612272 |
| India | -0.21087279 | -0.294393155 |
| Japan | 0.205839319 | 0.122829804 |

*Source*: author compilation
*Note.* The table compares the Pre-Invasion and Post-Invasion correlation coefficients.

Based on the Granger causality test results given in Table 3, the null hypothesis of no Granger causality is rejected for Malaysia, China, Bangladesh, South Korea, and India at a significance level of 0.05, indicating the presence of a unidirectional causality relationship between crude oil prices and the stock market index for these countries. This suggests that changes in crude oil prices cause changes in the stock market index for these countries, but not vice versa. On the other hand, the null hypothesis of no Granger causality cannot be rejected for Indonesia, Pakistan, the Philippines, Singapore, Taiwan, Thailand, and Vietnam at the significance level of 0.05, indicating that there is no significant causality relationship between crude oil prices and the stock market index for these countries.

Table 4. Granger Causality Test

| Pairwise granger causality | Observation | P value | Decision |
|---|---|---|---|
| Malaysia→Crude | 166 | 0.3554 | Unidirectional |
| Crude→Malaysia | | 0.0469 | |
| China→Crude | 166 | 0.282 | Unidirectional |
| Crude → China | | 0.0478 | |
| Bangladesh → Crude | 166 | 0.1 | Unidirectional |
| Crude → Bangladesh | | 0.0484 | |
| Indonesia → Crude | 166 | 0.95 | Independent |
| Crude → Indonesia | | 0.054 | |
| Pakistan → Crude | 166 | 0.51 | Independent |
| Crude → Pakistan | | 0.41 | |
| South Korea → Crude | 166 | 0.19 | Unidirectional |
| Crude → South Korea | | 0.0469 | |
| Philippines → Crude | 166 | 0.25 | Independent |
| Crude → Philippines | | 0.064 | |
| Singapore → Crude | 166 | 0.16 | Independent |
| Crude → Singapore | | 0.053 | |
| Taiwan → Crude | 166 | 0.09 | Independent |
| Crude → Taiwan | | 0.067 | |
| Thailand → Crude | 166 | 0.3 | Independent |
| Crude → Thailand | | 0.074 | |
| Vietnam → Crude | 166 | 0.79 | Independent |
| Crude → Vietnam | | 0.27 | |
| India → Crude | 166 | 0.3 | Unidirectional |
| Crude → India | | 0.042 | |
| Japan → Crude | 166 | 0.78 | Independent |
| Crude → Japan | | 0.06 | |

*Source*: author compilation

According to Table 4 the beta coefficient is a measure of the relationship between the dependent variable (stock index of Malaysia) and the independent variable (crude oil) in the regression model. A positive beta coefficient indicates a positive relationship between the two variables, while a negative beta coefficient indicates a negative relationship. In the case of the pre-war data, the beta coefficient of 0.096001 suggests a weak positive relationship between the stock index of Malaysia and crude oil. On the other hand, in the post-war data, the beta coefficient of -0.20365 suggests a negative relationship between the stock index of Malaysia and crude oil.

In the pre-invasion analysis, the R-squared value is 0.077083 for china, indicating that only 7.7% of the variance in the dependent variable is explained by the independent variable. The adjusted R-squared value is 0.05258, which suggests that the model may not fit the data well. The beta coefficient is -0.1127, indicating that there is a negative relationship between the stock index and crude oil, and for every unit increase in crude oil, the stock index decreases by 0.1127 units. The beta coefficient is -0.3694, which suggests a negative relationship between crude oil and the stock index, and for every unit increase in crude oil, the stock index decreases by 0.3694 units. Overall, the results indicate a negative relationship between crude oil and the stock index in both pre- and post-invasion analysis, and the impact of crude oil on the stock index is greater in the post-invasion analysis than in the pre-invasion analysis.

Table 5. Regression Analysis findings

| Regression Statistics | Pre-invasion Analysis | Post invasion Analysis |
|---|---|---|
| **Malaysia** | | |
| R Square | 0.072568 | 0.246307 |
| Adjusted R Square | 0.066031 | 0.15683 |
| Beta Coefficient | 0.096001 | -0.20365 |

| | | |
|---|---|---|
| Standard Error | 0.02202 | 0.04519 |
| **China** | | |
| R Square | 0.008942 | 0.1106818 |
| Adjusted R Square | 0.05258 | 0.0909091 |
| Beta Coefficient | -0.1127 | -0.369410 |
| Standard Error | 0.022299 | 0.0442374 |
| **Bangladesh** | | |
| R Square | 0.015472 | 0.10866 |
| Adjusted R Square | 0.007268 | 0.08969 |
| Beta Coefficient | -0.322932 | 0-1.9434 |
| Standard Error | 0.02168 | 0.043605 |
| **Indonesia** | | |
| R Square | 0.098899 | 0.162688 |
| Adjusted R Square | 0.056389 | 0.150888 |
| Beta Coefficient | 0.03359 | -0.028239 |
| Standard Error | 0.007332 | 0.010348 |
| **Pakistan** | | |
| R Square | 0.009497 | 0.001319 |
| Adjusted R Square | 0.001378 | -0.01993 |
| Beta Coefficient | -0.21064 | -0.138796 |
| Standard Error | 0.021669 | 0.046204 |
| **South Korea** | | |
| R Square | 0.146737583 | 0.1597473 |
| Adjusted R Square | 0.138448344 | 0.1431149 |
| Beta Coefficient | 0.050533926 | -0.015625 |
| Standard Error | 0.021543496 | 0.0099824 |
| **Philippines** | | |
| R Square | 0.177662 | 0.002271 |
| Adjusted R Square | 0.031564 | -0.01809 |
| Beta Coefficient | 0.365181245 | -0.15191 |
| Standard Error | 0.021125 | 0.045609 |
| **Singapore** | | |
| R Square | 0.023657 | 0.037689 |
| Adjusted R Square | 0.015588 | 0.018442 |
| Beta Coefficient | 0.33741 | -1.192164 |
| Standard Error | 0.021456 | 0.044509 |
| **Taiwan** | | |
| R Square | 0.010495 | 0.03148 |
| Adjusted R Square | 0.00166 | 0.011303 |
| Beta Coefficient | 0.269435 | 0.632903 |
| Standard Error | 0.022097 | 0.045 |
| **Thailand** | | |
| R Square | 0.121063 | 0.022733 |
| Adjusted R Square | 0.11342 | 0.001488 |
| Beta Coefficient | 1.1674 | -0.8819 |
| Standard Error | 0.020412 | 0.045179 |
| **Vietnam** | | |
| R Square | 0.00009 | 0.031902 |
| Adjusted R Square | -0.00861 | 0.01254 |
| Beta Coefficient | 0.022107 | 0.516128 |
| Standard Error | 0.022124 | 0.044642 |
| **India** | | |
| R Square | 0.044467 | 0.099101 |
| Adjusted R Square | 0.03637 | 0.091738 |
| Beta Coefficient | -0.312863 | -0.331147 |
| Standard Error | 0.02103 | 0.044634 |
| **Japan** | | |
| R Square | 0.04237 | 0.015087 |
| Adjusted R Square | 0.03397 | -0.00543 |
| Beta Coefficient | 0.34723 | 0.364644 |
| Standard Error | 0.021116 | 0.045405 |

It is evident that there is a negative correlation between the Dhaka DSE 30 stock index and crude oil prices. This is indicated by the negative beta coefficient in both the pre- and post-invasion analyses. In the pre-invasion analysis, the beta coefficient of -0.322932 suggests that for every unit increase in crude oil prices, the Dhaka DSE 30 stock index is expected to decrease by 0.322932 units. The R square and adjusted R square values indicate that crude oil prices explain only a small portion of the variation in the stock index, with the model accounting for only 1.55% of the variation. The data suggests that crude oil prices have a significant negative impact on the Dhaka DSE 30 stock index, with this impact becoming more pronounced after the invasion. Similarly, the pre-invasion analysis shows that there is a positive relationship between the Indonesian stock index IDX and crude oil, as evidenced by the beta coefficient of 0.03359. This means that an increase in crude oil prices is associated with an increase in the stock index of the Indonesian market. The post-invasion analysis shows that there is a weaker, negative relationship between the Indonesian stock index IDX and crude oil, as evidenced by the negative beta coefficient of -0.028239465. Overall, these results suggest that the relationship between crude oil prices and the stock index of the Indonesian market is not particularly strong and may be influenced by external factors such as political instability and weak market development. The weak result in the regression analysis between the Indonesian stock index IDX and crude oil may be due to the fact that the Indonesian stock exchange is not as well developed as other exchanges. The Beta Coefficient of -0.1387965 for Pakistan which suggests that there is still a negative relationship between the stock index and crude oil price after the invasion, but the effect size is small, which means that crude oil price has a limited impact on the stock index. For south Korea, the pre-invasion analysis, the R Square value is 0.1467, which suggests that about 14.67% of the variation in KOSPI can be explained by changes in crude oil prices. The adjusted R Square is 0.1384, which indicates that the model is reliable and not overfitting the data. The beta coefficient is negative at -0.0505, indicating that a decrease in crude oil prices is associated with an increase in KOSPI. For Philippines, we see a significant decrease in the beta coefficient, indicating that the relationship between the PSEI Index and crude oil prices has weakened. The beta coefficient is now -0.152, which suggests a negative relationship between the two variables. The R-squared value of 0.002 indicates that only 0.2% of the variance in the PSEI Index can be explained by changes in crude oil prices. These results suggest that the impact of the Russia-Ukraine war on the PSEI Index and crude oil prices was significant, and that the relationship between the two variables has changed. Overall, the analysis suggests that the PSEI Index is negatively impacted by the Russia-Ukraine war, as evidenced by the negative beta coefficient in the post-invasion analysis.

The regression analysis for Singapore SGX Nifty and crude oil prices shows that the pre-invasion R-squared value is 0.023657, indicating that only 2.37% of the variance in SGX Nifty can be explained by changes in crude oil prices. The beta coefficient of 0.33741 suggests a weak positive correlation between the two variables.

In the post-invasion period for Taiwan , the R square value is 0.03148, which suggests that 3.15% of the variation in TWSE can be explained by changes in crude oil prices. The beta coefficient is 0.632903, which indicates that a 1% increase in crude oil prices leads to a 0.632% increase in TWSE. The adjusted R square value is 0.011303, which suggests that the model has only slightly higher explanatory power than the pre-invasion period. The negative correlation coefficients of -0.10244536 and -0.177426851 indicate that as the price of crude oil increases, the stock market index in Taiwan tends to decrease. This negative correlation is stronger in the post-invasion period, with a larger absolute value of the coefficient.

The correlation coefficient for Thailand shows a significant shift from positive correlation pre-invasion to negative correlation post-invasion. Before the invasion, there was a strong positive correlation between crude oil prices and the stock market index of Thailand, suggesting that as the oil prices increased, the stock market index also increased. However, post-invasion, there is a stronger negative correlation between crude oil prices and the stock market index of Thailand, indicating that as oil prices decreased, the stock market index also decreased.

In the post-invasion analysis, the R-squared value has increased to 0.031902, suggesting that the relationship between crude oil and VNI may have strengthened. The adjusted R-squared value is also higher than the pre-invasion analysis, indicating that the model is a better fit for the data. The beta coefficient of 0.516128 is positive, indicating that there is still a positive relationship between crude oil prices and the VNI index, but the coefficient is larger than in the pre-invasion analysis, suggesting a stronger relationship. The standard error of 0.044642 is also relatively high, suggesting that there is still a high degree of variability in the data.

The R square value of 0.044 indicates that only 4.4% of the variation in Nifty 50 India can be explained by changes in crude oil prices, and the beta coefficient of -0.312 suggests that there is a negative impact of crude oil prices on Nifty 50 India. The beta coefficient of -0.331 suggests that there is a negative impact of crude oil prices on Nifty 50 India, meaning that as crude oil prices increase, Nifty 50 India tends to decrease.

The R Square value of 0.04237 for Japan indicates that only about 4.2% of the variation in the Japan Nikkei stock index can be explained by changes in crude oil prices before the war. The Adjusted R Square value of 0.03397 indicates that when taking into account the number of variables in the model, the explanatory power of the model is even lower.

The positive Beta Coefficient value of 0.364644 suggests that there was still a positive correlation between crude oil prices and the Japan Nikkei stock index after the war. However, the R Square and Adjusted R Square values suggest that the correlation is even weaker after the war. This may suggest that other factors, such as changes in government policies, market sentiments, or geopolitical developments may have become more influential in driving the Japan Nikkei stock index after the war.

**Johnsen Cointegration Test Results**

In order to measure the relationship between Returns of Crude oil and different countries indices Cointegration test is conducted, this study helps to find out the long-term equilibrium relationship. Results from the below table shows the relationship existing between respective country's stock index returns and crude oil returns during the selected period of crisis, it shows the high convergence of crude oil and market during the war period as well, hence portfolio managers have to consider hedging strategy through diversification.

Table 6. Empirical Results of Johnsen Cointegration

| Country | Trace Statistics | Result |
|---|---|---|
| Bangladesh | 101.82*** 45.50 | Cointegration exists |
| China | 103.66*** 47.82 | Cointegration exists |
| Indonesia | 93.29*** 39.41 | Cointegration exists |
| Pakistan | 111.50*** 47.19 | Cointegration exists |
| South Korea | 102.39*** 47.44 | Cointegration exists |
| Malaysia | 100.11*** 43.30 | Cointegration exists |
| India | 91.65*** 38.72 | Cointegration exists |
| Japan | 115.34*** 52.63 | Cointegration exists |
| Philippines | 119.82*** 53.13 | Cointegration exists |
| Singapore | 86.63*** 32.21 | Cointegration exists |
| Thailand | 94.12*** 41.24 | Cointegration exists |
| Taiwan | 97.99*** 44.30 | Cointegration exists |
| Vietnam | 94.27*** 35.49 | Cointegration exists |

*Significance at 1% with critical values at 15.49 and 3.84*
*Source*: author compilation

The Empirical results of GARCH for the selected period are illustrated in the below table. ARCH term (α) of the equation represents recent news which is short term and its value of all the countries are statistically significant and, which implies the recent news has impacted stock market volatility except in the case of Pakistan. Whereas GARCH ($\beta$) term implies the impact from old news which is significant in all the markets except in the case of Malaysia. Result shows that changes in crude oil have a greater impact on the Asian stock market returns during the Russian-Ukraine war period.

Table 7. Empirical results based on the GARCH model for the whole period

| Country | μ | α | β |
|---|---|---|---|
| Bangladesh | 1.08E-05* | 0.1448*** | 0.7074*** |
| China | 1.53E-05* | 0.0906** | 0.8358** |
| Indonesia | 6.63E-06 | 0.1564** | 0.7536** |
| Pakistan | 9.38E-06 | 0.0038 | 0.9148*** |
| South Korea | 1.68E-05 | 0.1451* | 0.7103*** |
| Malaysia | 7.84E-05*** | 0.7573*** | -0.0046 |
| India | 7.08E-06 | 0.1562*** | 0.7904*** |
| Philippines | 2.78E-05 | 0.1007* | 0.7026*** |
| Singapore | 1.73E-05*** | 0.3053** | 0.3812*** |
| Thailand | 7.79E-06 | 0.1183* | 0.7332*** |
| Taiwan | 4.74E-06* | 0.0975** | 0.8657*** |
| Vietnam | 7.82E-06*** | 0.1784*** | 0.7870*** |

* denotes significant at 10%, ** denotes significant at 5%, *** denotes significant at 1%
*Source*: author compilation

## Findings and Conclusion

The finding of this study suggests that the Russia-Ukraine conflict has had a significant impact on the relationship between crude oil prices and stock market indices of several countries in the Asia-Pacific region. The extensive research available on the subject only investigated the impact of the Russia-Ukraine war on the stock market and crude oil prices of the various countries or industries and concluded a negative impact, but to the best of the author's knowledge no research has been done on investigating the interconnection tapestry of Russia-Ukraine warfare, crude oil prices in Asian stock markets.

The study shows that the data for all the countries under consideration is stationary at level based on the unit root test. This suggests that the time series data for all the countries have no unit root, and thus, they are stationary. Specifically, Malaysia, China, Bangladesh, Indonesia, Taiwan, South Korea, and India showed a stronger negative correlation between crude oil prices and stock market indices post-invasion. This suggests that the war has affected the economic conditions of these countries, leading to changes in the relationship between oil prices and their respective stock markets.

Furthermore, the Granger causality null hypothesis was rejected for Malaysia, China, Bangladesh, South Korea, and India, indicating that there is a causal relationship between changes in crude oil prices and stock market movements in these countries. Regression analysis also showed that Malaysia, China, Bangladesh, the Philippines, Singapore, Thailand, and India had a stronger negative beta coefficient post-invasion, indicating that changes in crude oil prices have a greater impact on these countries' stock markets post-invasion.

It is important to note that some countries did not show a significant relationship between crude oil and their stock market indexes during the post-invasion period. This may be due to a variety of factors, such as underdeveloped stock markets, low economic dependence on crude oil, or other unique characteristics of the country's economy.

There are several potential avenues for further research. Firstly, it would be valuable to investigate the reasons behind the stronger negative correlation observed between crude oil and stock market indices of certain countries post-invasion. This could involve exploring the specific economic and geopolitical factors that contributed to these correlations, and how they differed from those in other countries. Secondly, further investigation into the rejected null hypothesis of Granger causality for certain countries could provide additional insights into the causal relationship between crude oil prices and stock market indices. This could involve exploring alternative causal models or conducting more rigorous statistical tests.

While the findings of our study demonstrate a negative correlation between crude oil prices and certain Asian stock indices during the Russia-Ukraine War, it is worth exploring why other stock indices did not exhibit such a relationship. One possible avenue for further investigation is to examine the unique characteristics of the stock markets in question, such as differences in market structure, investor sentiment, or regulatory frameworks, that may have shielded them from the impact of oil price fluctuations.

The study suffers from a few limitations such as it only examines the relationship between crude oil prices and stock market indices but there are other macroeconomic factors, such as interest rates, inflation, and political

instability which also affect the market. The Russia-Ukraine conflict is just one of many geopolitical events that can affect crude oil prices, the future researchers can also consider Israel humas war, middle east conflict etc to test the impact. This study does not attribute all of the fluctuations in Asian stock markets to oil prices, as it is only one of many factors influencing corporate earnings, such as inflation, GDP, exchange rate, and so on. As a result, there is still room for further research into the impact of individual as well as collective macroeconomic factors on the value of stocks in Asian and global stock markets.

## Credit Authorship Contribution Statement

**Anubha Srivastava** has given idea for conceptualization of the paper and contribution to methodology of the paper. **B.S. Arjun** has worked on its methodology and software to be used for analysis. **Ritu Wadhwa** has written the first draft and take care of Data. **Purwa Srivastava** has supervised the entire paper and validated the data. **Neha Singh** and **Chaandni Gautam** has done all review and editing.

## Declaration of Competing Interest

No Competing interest amongst the authors.

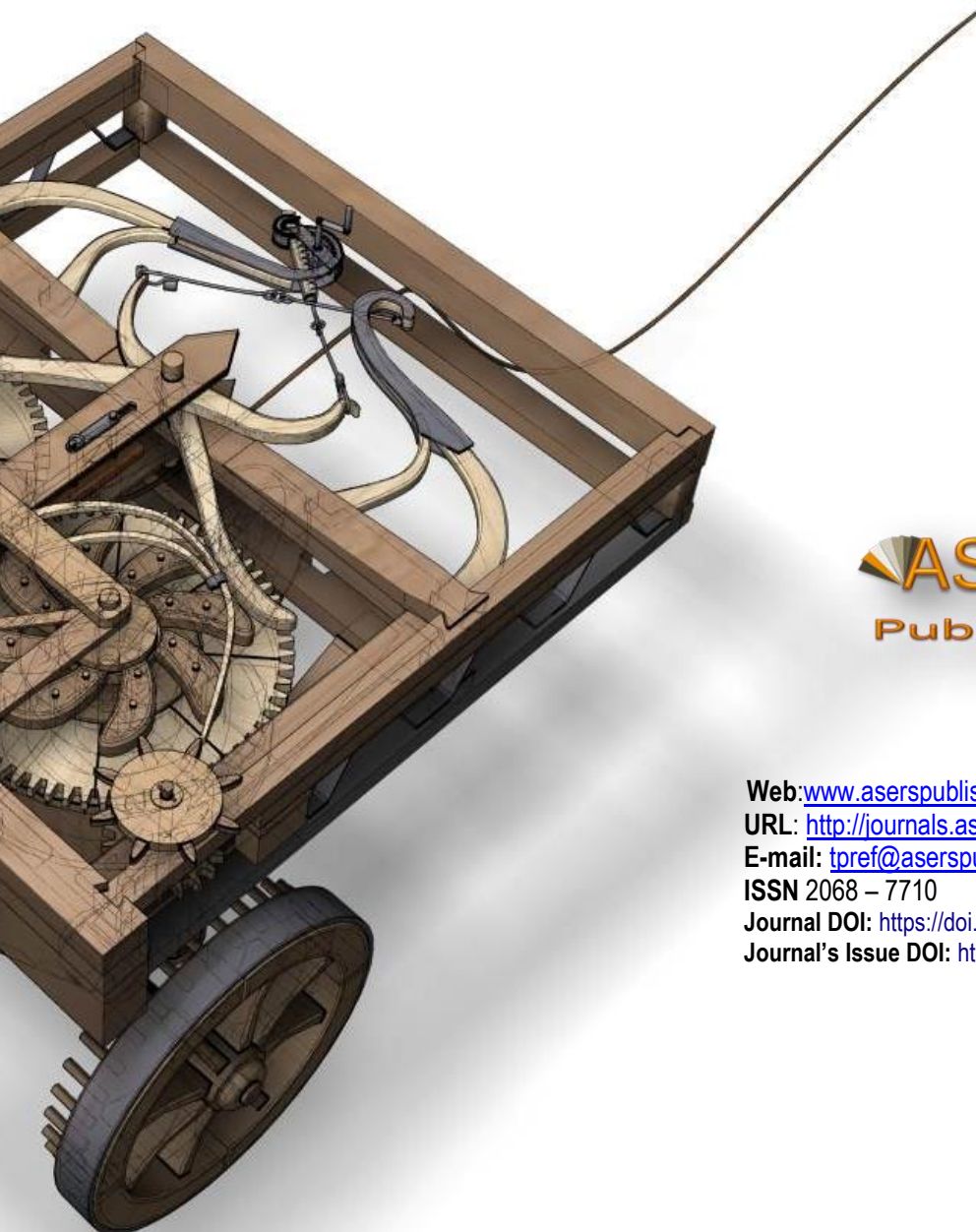## Declaration of Use of Generative AI and AI-Assisted Technologies

No use of generative AI in the paper.

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