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IMPACT OF GEOPOLITICAL RISK AND CRUDE OIL PRICES ON STOCK RETURN

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ABSTRACT

This study examines the impact of oil price and geopolitical risk (*GPR*) on sectoral stock returns in Australia, Japan, the USA, and India. We find that oil price positively affects pharma and commodity stocks, while *GPR* benefits commodity stocks, excluding the banking sector in Australia. Further, *GPR* negatively impacts banking stocks due to increased uncertainty and risk aversion only in the case of the USA. Similarly, *GPR* adversely affects banking stocks in India that leads capital outflows and economic instability, while oil prices positively influence pharma and commodity stocks.

Keywords: Stock returns; Geopolitical risk; Crude oil.
JEL Classifications: E30; G10; G12.

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I. INTRODUCTION

This study investigates the effect of geopolitical risk (*GPR*) and crude oil prices on sector-specific stock returns. The issue has relevance for investment and policymaking for two basic reasons. Firstly, *GPR* encompasses events such as wars, political instability, terrorism, trade disputes, sanctions, and other geopolitical developments that significantly influence investment decisions. These risks often introduce uncertainty that lead to sudden shifts in investor sentiment. Secondly, crude oil is a crucial input for various industries, including pharmaceuticals, commodities, and banking. Change in oil prices can affect production costs, erode profit margins, and subsequently negatively affect stock returns (Smyth and Narayan, 2018). *GPR* increases stock market volatility with more pronounced price fluctuations that results into potentially greater investment losses (Xiao *et al*., 2023). Similarly, the overall investment and policy investment decision is sensitive to oil price movements. It is often regarded as a barometer of economic health. When the oil price fluctuates signalling broader economic conditions. This can raise concerns about inflation, higher input costs, and slower economic growth due to rising crude oil prices. Thus, it leads to a decline in investor confidence and affecting stock returns across various sectors.

A plethora of studies have explored the relationship between *GPR* and crude oil prices (Narayan and Sharma, 2011; Antonakakis *et al*., 2017; Cunado *et al*., 2020; Zhang *et al*., 2022). Narayan and Sharma (2011) find that oil price affects firms' return differently subject to their sectoral location. Antonakakis *et al*. (2017) employed the VAR-BEKK-GARCH model to analyze monthly crude oil and stock returns. They conclude that while crude oil negatively impacts stock returns whereas *GPR* does not significantly influence stock market volatility. In contrast, Cunado *et al*. (2020) document that *GPR* adversely affects crude oil stocks due to a decrease in global economic activities. Zhang *et al*. (2022) note that geopolitical risk could predict crude oil prices.

Additionally, a strand of literature exists on the relationship between *GPR* and macroeconomics (Duan *et al*., 2021; Caldara *et al*., 2022). Duan *et al*. (2021) document that there is a medium-term co-movement between *GPR* and exchange rates. Caldara *et al*. (2022) find that *GPR* exerts downward pressure on global economic activities while simultaneously pushing inflation upwards. Moreover, numerous studies have examined the impact of *GPR* on sectoral stock returns, such as banking, pharmaceuticals, and commodities (Alsagr, N, 2020; Yildirim *et al*., 2022; Phan *et al*., 2022; Gong *et al*., 2022). Alsagr (2020) identified a significant negative impact of *GPR* on the banking sector in both oil-dependent and non-oil-dependent emerging economies. Ding and Zhang (2021) investigate the impact of *GPR* on the systematic risk spillover in the commodity market using the STVAR model. They conclude that there is a stronger risk spillover of energy commodities in low frequency whereas metal commodities are replaced in the longest term. Yildirim *et al*. (2022) analyzed quarterly data for G7 countries to reveal the adverse effects of *GPR* on banking sector performance. Phan *et al*. (2022) noted a rise in *GPR* with a decline in bank stability, while Gong and Xu (2022) discovered that *GPR* significantly affects the interconnectedness of commodity markets.

There still exists following three research gaps in the above-mentioned literature. First, none of the studies have concurrently considered *GPR*, crude oil

prices, and stock returns. Second, most studies have overlooked sector-specific stock returns, such as those in the pharmaceutical, banking, and commodity sectors. Third, there is a lack of comparative analysis between developed and developing economies. This study aims to bridge these gaps by investigating the impact of *GPR* and crude oil price on stock returns by considering data at sector level.

The contributions of this study are threefold. Firstly, the study highlights how oil prices and GPR uniquely influence different sectors in various countries. For instance, in Australia, oil prices positively affect pharma and commodity stocks but negatively impact banking stocks. This underscores the importance of sector-specific policies in managing economic risks associated with oil price fluctuations and geopolitical tensions. Secondly, the findings indicate distinct responses in different countries to GPR and oil price changes. For example, GPR negatively affects banking stock returns in the USA and India due to increased uncertainty and risk aversion, while in Japan and Australia, oil prices positively influence certain sectors. This suggests the need for tailored economic and financial policies in each country to address these varied impacts. Finally, the study's findings on the negative impact of GPR on banking stocks in countries like the USA and India, due to heightened uncertainty and economic instability. Thus, the robust financial regulations and policies are needed to safeguard the banking sector. Moreover, the varying effects on different sectors provide insights for investors regarding diversification strategies and risk management in the context of geopolitical and economic fluctuations.

The rest of the paper is structured as follows. Section II provides a discission on hypothesis development followed by the discussion of data and methodology in Section III. Main findings are then discussed in Section IV and finally we provide some concluding remarks in Section V.

II. HYPOTHESIS DEVELOPMENT

Geopolitical events and threats can significantly affect macroeconomic variables through variety of channels, including the loss of human life, destruction of capital stock, increased military spending, and heightened uncertainty (Caldara *et al*., 2022). These impacts channels through the pharmaceutical industry, commodity markets, and the banking sector across both developed and developing nations, such as the USA, Australia, Japan, and India, respectively.

Understanding the relationship between crude oil prices, stock returns, and *GPR* across various economic sectors is crucial for both investors and policymakers. For policymakers, this understanding is critical as crude oil prices influence inflation rates (impacting monetary policy), energy security (affecting energy policies), and is intertwined with geopolitical dynamics (influencing foreign policy). On the other hand, for investors, it is paramount because fluctuations in crude oil prices can be transmitted to stock returns, impacting investment values.

A notable conduit through which oil prices may affect equity prices is the cash flow hypothesis, as proposed by Fisher (1930) and Williams (1938) Numerous factors can modify the expected cash flows that impact stock returns (Behera, 2023). For instance, firms that consume oil regard it as a significant factor of production.

An increase in oil prices elevates costs, which in turn diminishes profit levels, thus, it leads to a reduction in future cash flows (Filis *et al*., 2010). Conversely, when the profit margin of oil-producing firms rises due to an increase in oil prices, there is an uptick in expected cash flows (Degiannakis *et al*., 2018). This dynamic significantly influences investment decisions through the cash flow mechanism.

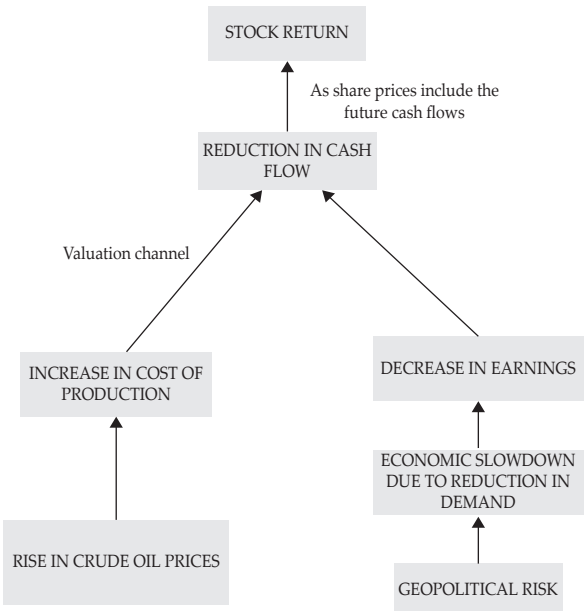
Similarly, there is a growing recognition that geopolitical events and the associated risks can trigger economic fluctuations. Drawing from this understanding, policymakers and financial investors assert that geopolitical risk is a vital determinant of financial market dynamics and firms' investment behaviour (Güntner and Henßler, 2021). This recognition underscores the imperative for a nuanced analysis of *GPR* to better navigate the complex economic landscape and make informed policy and investment decisions.

The following flow chart provides a detailed depiction of the transmission channels between crude oil, *GPR,* and stock return. Figure 1 illustrates that a rise in oil prices leads to an increase in production costs, which in turn results in a reduction in cash flow, and subsequently, a decline in stock returns. Similarly, *GPR* dampens economic activities, affecting the earnings and cash flow of companies, which adversely impacts stock returns.

From the above-mentioned theocratical and empirical literature, our hypotheses are as follows. First, geopolitical uncertainties could elevate risk levels in pharmaceutical, commodity, and banking sectors and therefore, negatively affects stock returns.

Figure 1.
Flow Chart between Geopolitical Risk, Crude Oil, and Stock Return

This figure presents the channel of transmission from *GPR and* Crude Oil to Stock Returns. Further, it indicates the rise in oil prices will affect stock return through valuation channel whereas *GPR* affects stock returns through demand shock.



Source: Authors' calculation.

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III. DATA AND METHODOLOGY

This study employs daily data spanning the period September 13, 2017 to May 30, 2023. We use closing prices of sectoral indices, namely pharmaceutical, banking, and commodity for four countries, namely Japan, Australia, the USA, and India. The pertinent data concerning the indices and *WTI* crude oil prices are retrieved from the CEIC database. Subsequently, the data is transformed into continuous log returns to facilitate the analysis. We use country-specific *GPR* indices developed by Caldara and Iacoviello (2018). *GPR* index is constructed based on the frequency of articles discussing geopolitical events and risks, identified through automated text searches initiated in 1985. A total of 11 newspapers with electronic archives were included in this search: The Boston Globe, Chicago Tribune, Daily Tribune, Financial Times, The Globe and Mail, The Guardian, Los Angeles Times, The New York Times, The Times, The Wall Street Journal, and The Washington Post.

Moreover, Caldara and Iacoviello (2018) extended the *GPR* Index to encompass historical data dating back to 1900, albeit with a narrowed scope, focusing solely on three newspapers, The New York Times, Chicago Tribune, and Washington Post. This expanded historical index provides a deeper longitudinal insight into geopolitical risks over time, enriching the contextual backdrop against which the financial data is analyzed.

Next, following Westerlund and Narayan (2012, 2015), we estimate time-series regression for each sector to investigate whether *GPR* and *WTI* predict stock returns. Our empirical model is as follows.

$$SR_{ti} = \alpha + \beta_1 GPR_{t-1} + \beta_2 \Delta GPR_t + \beta_3 WTI_{t-1} + \beta_4 \Delta WTI_t + \varepsilon_t \quad (1)$$

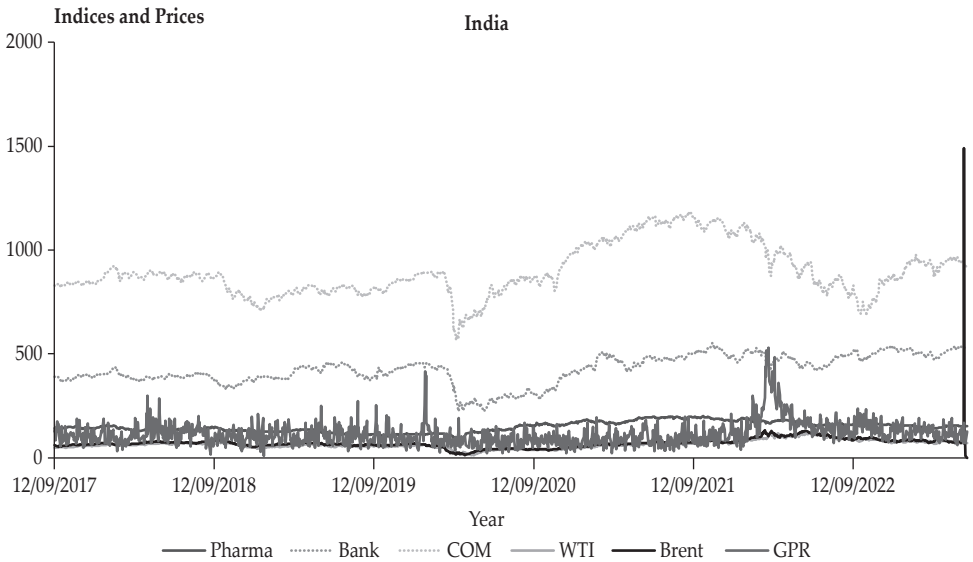
where in Equation (1), SR_{ti} refers to stock returns at time period t and subscript i represents the three sectors i.e. pharma, commodity, and banks. Further, *GPR* stands for geopolitical risk and WTI represents crude oil prices. ε_t refers to an error term at time period t. Further, slope coefficient, β_1 and β_3 indicate possible prediction capabilities of *GPR* and *WTI* on sectoral stock returns.

IV. MAIN FINDINGS

Initially, we employ graphs to examine the trends of the variables under consideration. Figures 2, 3, 4, and 5 illustrate the trends in sectoral indices such as *GPR* and crude oil prices for four countries, India, the USA, Australia, and Japan respectively. It is observed from the graphs that all the series fluctuate over time. For instance, during the COVID-19 pandemic period of 2020-21, the commodity and bank stocks in all four countries experienced a downturn. A similar pattern is observed during the global economic slowdown in 2022. Moreover, *GPR* in India and Japan spiked in the early part of 2022, primarily due to the Russian invasion of Ukraine among other geopolitical issues. However, the *GPR* in the USA and Australia remained relatively unaffected by these global tensions and geopolitical developments.

Figure 2.
Sectoral Indices, GPR and Crude Oil of India

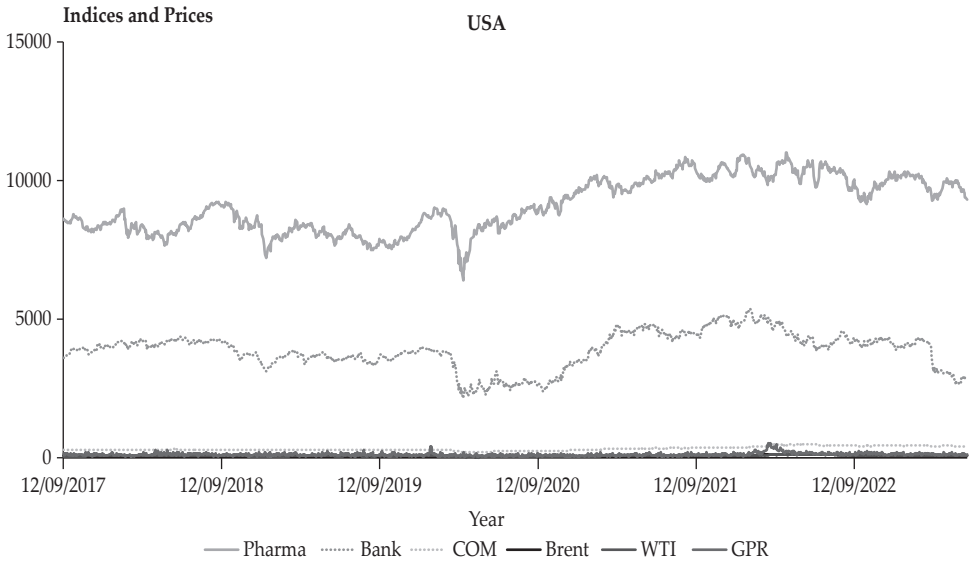
This graph presents the trend line of sectoral indices, *GPR* and Crude Oil in case of India.



Source: Authors' calculation.

Figure 3.
Sectoral Indices, GPR and Crude Oil of USA

The chart illustrates the trajectory of sectoral indices, along with GPR and Crude Oil trends, specific to USA.



Source: Authors' calculation.

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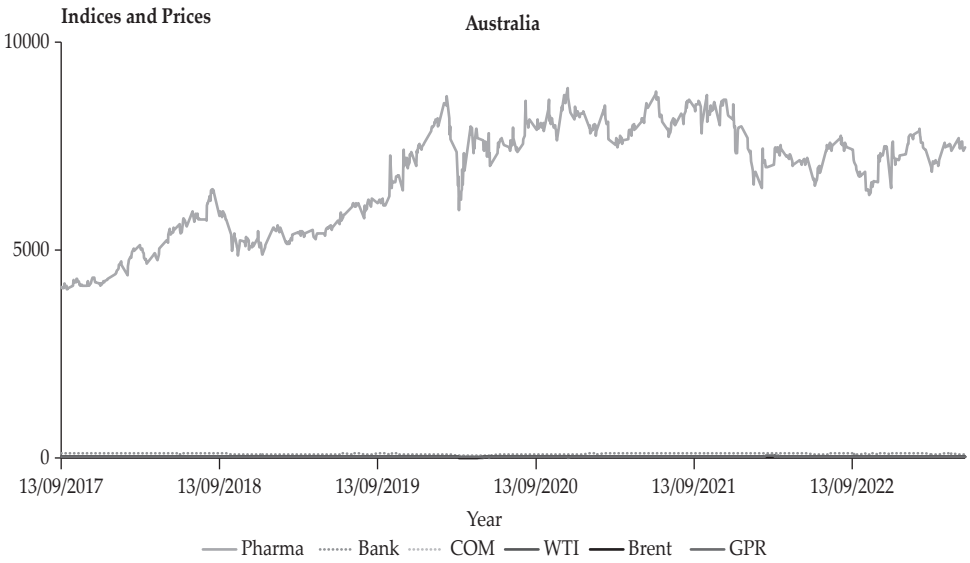
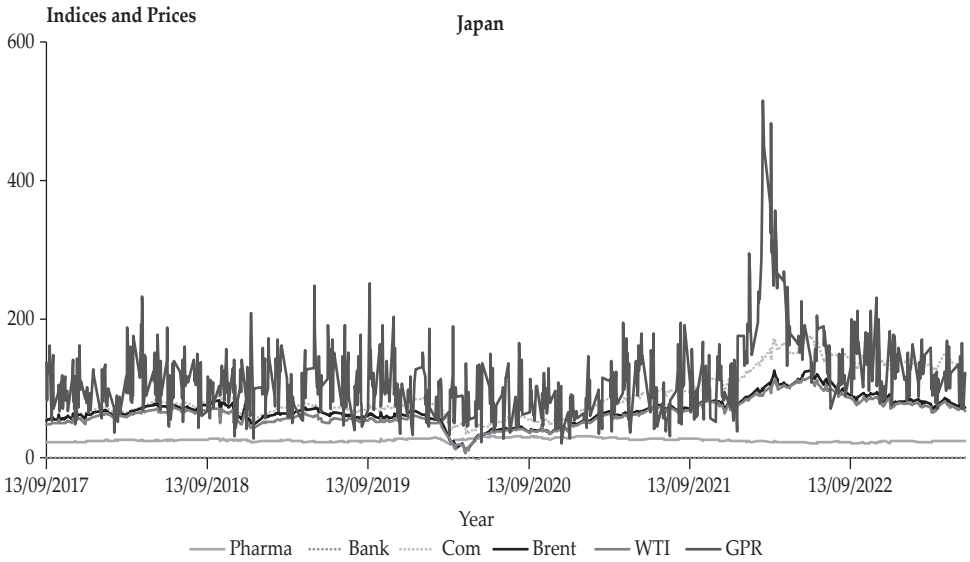
Figure 4.
Sectoral Indices, GPR and Crude Oil of Australia
This diagram displays the progression of sectoral indices, GPR, and Crude Oil within the Australia context.



Source: Authors' calculation.

Figure 5.
Sectoral Indices, GPR and Crude Oil of Japan
The graph delineates the movement of sectoral indices, GPR, and Crude Oil trends in the Japan scenario.



Source: Authors' calculation.

We further report descriptive statistics in Table 1. We note that the banking stock and *GPR* indices exhibit high volatility across the surveyed countries. This heightened volatility might be attributable to the regions' centrality in geopolitical tensions, spurred by major power competition, territorial disputes, and intricate security dynamics. On the other hand, the variables such as crude oil and sectoral returns display lower volatility. Moreover, all the considered variables exhibit a negative skewness, with the exception of the pharmaceutical stock returns in Australia. Lastly, while sectoral returns and crude oil demonstrate fat-tailed distributions, the *GPR* index does not share this same characteristic.

Table 1.
Descriptive Statistics

This table reports some commonly known (namely, maximum, minimum, standard deviation, skewness, and kurtosis) descriptive statistics of all variables used in this study.

Country	Variables	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
Australia	GPR	0.647	-0.842	0.197	-0.046	0.867
	WTI	0.189	0.031	0.022	-2.049	67.280
	PHARMA	0.062	-0.054	0.009	0.075	6.806
	COMMODITY	0.032	-0.037	0.005	-0.391	6.832
	BANK	0.049	-0.127	0.101	-2.694	36.682
Japan	GPR	0.647	-0.842	0.197	-0.046	0.866
	WTI	0.189	-0.313	0.022	-2.049	67.279
	PHARMA	0.040	-0.065	0.006	-0.855	13.582
	COMMODITY	0.079	-0.158	0.015	-1.759	21.213
	BANK	0.060	-0.115	0.009	-1.218	37.160
USA	GPR	1.108	-1.301	0.206	-1.301	1.948
	WTI	0.163	-0.128	0.016	-0.007	29.292
	PHARMA	0.028	-0.043	0.005	-0.369	7.064
	COMMODITY	0.030	-0.036	0.005	-0.730	6.900
	BANK	0.054	-0.073	0.009	-0.613	9.339
India	GPR	1.018	-1.301	0.206	-0.109	1.945
	WTI	0.163	-0.128	0.016	-0.007	29.292
	PHARMA	0.046	-0.041	0.006	-0.100	5.403
	COMMODITY	0.035	-0.065	0.006	-1.053	14.236
	BANK	0.047	-0.084	0.007	-1.182	8.134

Table 2.
Unit Root Test Result

This table reports results obtained from the two-unit root tests, namely Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP). The null hypothesis is that the series contain unit root (or follow a non-stationary process). * indicates statistical significance at the 1% level.

Country	Variables	ADF		PP	
		Level	1st Diff.	Level	1st Diff.
Australia	GPR	-39.501*	-21.212*	-39.501*	-40.308*
	WTI	-40.138*	-15.986*	-40.138*	-38.591*
	PHARMA	-35.111*	-16.280*	-35.111*	-35.044*
	COMMODITY	-17.672*	-33.903*	-33.903*	-34.541*
	BANK	-33.134*	-15.176*	-33.134*	-32.770*
Japan	GPR	-39.501*	-21.212*	-39.501*	-40.308*
	WTI	-40.138*	-15.986*	-40.138*	-38.591*
	PHARMA	-32.094*	-13.783*	-32.094*	-31.903*
	COMMODITY	-1.973	-0.500	-34.415*	-34.921*
	BANK	-31.515*	-17.924*	-31.515*	-31.703*
India	GPR	-29.821*	-22.177*	-120.372*	-160.773*
	WTI	-21.348*	-19.122*	-38.683*	-134.335*
	PHARMA	-37.714*	-31.139*	-37.897*	-114.523*
	COMMODITY	-22.717*	-23.978*	-34.587*	-106.060*
	BANK	-34.029*	-31.702*	-34.031*	-146.040*
USA	GPR	-29.821*	-22.177*	-120.371*	-160.773*
	WTI	-21.349*	-19.122*	-38.683*	-134.335*
	PHARMA	-39.728*	-37.753*	-39.702*	-129.574*
	COMMODITY	-36.631*	-22.599*	-36.671*	-117.371*
	BANK	-40.408*	-24.833*	-40.091*	-129.355*

Next, we conduct unit root test to examine the stationarity of all variables. These results are reported in Table 2. We observe that all the variables are stationary at the level except for commodity in the case of Japan. Then, we use PP test where it is observed that all the variables under considerations are stationary in the level. Next, we read our main findings from Table 3. More specifically, in this table we report results obtained from the Westerlund and Narayan's (2012, 2015) predictability test. In the case of Australia, we find that oil price has a positive and statistically significant effect on pharma and commodity stock returns but negative and statistically significant effect on banking stock returns. *GPR* is found to have a positive and statistically significant effect on Australia's commodity stock returns. This positive effect in Australia is due to two reasons: geopolitical tensions raise global commodity prices, benefiting Australian stocks, and investors turn to safe assets like gold during uncertainty, boosting these stocks. Further, we find positive effect of oil on three Japanese sectoral stock returns.

In the case of the USA, *GPR* is reported to have a negative and statistically significant effect only on banking stock returns. Geopolitical risks lower USA bank stocks due to uncertainty and investor caution. These risks lead to less investment and lending. They also cause market volatility and economic instability which hurts the USA bank profits. However, current oil prices boost all the USA

sectoral returns. In the case of India, *GPR* also negatively impacts banking stock returns. This is due to increased uncertainty that leads to capital flight and less foreign investment. Such risks in India heighten economic instability, increasing banks' non-performing assets. This affects Indian banks' profitability and stock performance. Further, we note that in the case of India, current oil prices positively affect pharma and commodity stock returns. These finding aligns with existing literature (see for example, Thorbecke, 2019). The possible reasons could be favourable economic conditions help in increased demand for oil, reflecting in enhanced company profits followed by stock return.

We have further conducted robustness check of our main findings simply by substituting *WTI* crude oil prices with *BRENT* crude oil prices in Equation (1). These results are reported in Table 4. Our findings remain consistent with what we have noted earlier from Table 3.

Table 3.
Main Findings

This table reports our predictability regression-based results where sectoral stock return is regressed on one-period lags of GPR and WTI as depicted by Equation (1). * and ** indicate 1% and 5% level of significance. Probabilities values are there in the parenthesis.

Country	Variables	Pharma	Commodity	Bank
Australia	C	0.000 (0.37)	0.000 (0.68)	-0.000 (0.71)
	Lag GPR	0.000 (0.98)	0.002* (0.00)	0.000 (0.78)
	GPR	0.001 (0.57)	0.001 (0.21)	-0.001 (0.39)
	Lag WTI	-0.011 (0.45)	-0.006 (0.41)	0.016 (0.28)
	WTI	0.061* (0.00)	0.131* (0.00)	-0.138* (0.00)
Japan	C	0.000 (0.91)	0.000 (0.41)	-0.000 (0.79)
	Lag GPR	0.001 (0.28)	-0.003 (0.26)	0.001 (0.27)
	GPR	-0.000 (0.69)	-0.003 (0.27)	0.000 (0.88)
	Lag WTI	-011 (0.31)	0.007 (0.74)	-0.000 (0.99)
	WTI	0.044* (0.00)	0.216* (0.00)	0.075* (0.00)
USA	C	0.000 (0.87)	0.000 (0.27)	0.000 (0.73)
	Lag GPR	-0.000 (0.21)	0.000 (0.37)	-0.003** (0.02)
	GPR	0.001 (0.11)	0.000 (0.85)	0.000 (0.85)
	Lag WTI	-0.005 (0.54)	0.006 (0.24)	-0.017 (0.25)
	WTI	0.038* (0.00)	0.214* (0.00)	0.093* (0.00)

Table 3.
Main Findings (Continued)

Country	Variables	Pharma	Commodity	Bank
India	C	0.000 (0.89)	0.000 (0.87)	0.000 (0.63)
	Lag GPR	-0.001 (0.11)	-0.000 (0.37)	-0.002** (0.03)
	GPR	0.000 (0.62)	0.000 (0.56)	-0.002*** (0.07)
	Lag WTI	-0.017 (0.12)	0.009 (0.25)	-0.008 (0.51)
	WTI	0.025** (0.02)	0.057* (0.00)	0.011 (0.38)

Table 4.
Robustness Test

We estimate Equation (1) once again but used brent oil price instead of WTI oil price for robustness check. These results are reported in this Table. *, **, and *** denotes statistical significance at 1%, 5%, and 10%, levels, respectively. P-values are indicated within parentheses.

Country	Variables	Pharma	Commodity	Bank
Australia	C	0.000 (0.36)	0.000 (0.69)	-0.000 (0.69)
	Lag GPR	0.000 (0.82)	-0.002** (0.02)	-0.000 (0.72)
	GPR	0.000 (0.64)	0.000 (0.35)	-0.001 (0.32)
	Lag BRENT	-0.035** (0.01)	0.019* (0.00)	0.25** (0.09)
	BRENT	0.111* (0.00)	0.133* (0.00)	0.172* (0.00)
Japan	C	0.000 (0.89)	0.000 (0.41)	-0.000 (0.79)
	Lag GPR	0.001 (0.25)	0.237 (0.24)	-0.237 (0.23)
	GPR	-0.128 (0.56)	-0.128 (0.18)	-0.128 (0.98)
	Lag BRENT	-0.017 (0.95)	-0.017* (0.00)	-0.017* (0.09)
	BRENT	0.003* (0.00)	0.003* (0.00)	0.003* (0.00)
USA	C	0.000 (0.87)	0.000 (0.27)	-0.000 (0.72)
	Lag GPR	-0.001 (0.13)	0.000 (0.99)	-0.003** (0.02)
	GPR	0.001 (0.13)	0.000 (0.81)	-0.000 (0.79)
	Lag WTI	-0.031* (0.00)	0.165* (0.00)	-0.031*** (0.07)
	WTI	0.069* (0.00)	0.219* (0.00)	0.128* (0.00)

Table 4.
Robustness Test (Continued)

Country	Variables	Pharma	Commodity	Bank
India	C	0.000 (0.89)	0.000 (0.84)	0.000 (0.64)
	Lag GPR	-0.001* (0.09)	-0.000 (0.35)	-0.003** (0.03)
	GPR	0.000 (0.62)	0.000 (0.52)	-0.002 (0.06)
	Lag WTI	0.001 (0.74)	0.003 (0.24)	0.000 (0.83)
	WTI	0.000 (0.98)	0.003 (0.25)	0.000 (0.84)

V. CONCLUSION

Our study offers a comprehensive investigation into the intricate relationships between *GPR, crude oil prices*, and sectoral *stock returns*. Our empirical analysis is based on the predictability approach developed by Westerlund and Narayan (2015) using data for four countries namely Australia, Japan, the USA, and India. We find statistically significant effect of oil price and *GPR* on sectoral stock returns. For instance, in the case of Australia, current oil prices positively influence pharma and commodity stock returns but has a negative effect on banking stock returns. Geopolitical tensions benefit Australian commodity stocks. This is because global tensions raise commodity prices and drive investors to safe assets like gold, boosting these stocks. This study also shows that current oil prices positively affect three sectors in Japan.

In the case of the USA, *GPR* negatively impacts only banking stock returns. This is due to increased uncertainty and investor risk aversion that leads to reduced investments and lending. This risk also causes market volatility and economic instability, negatively affecting the USA bank profits. However, current oil price has a positive effect on all sectoral stock returns. In India, *GPR* similarly harms banking stocks, primarily due to heightened uncertainty causing capital outflows and reduced foreign investment. These risks increase economic instability which results into more non-performing assets in banks. Thus, it affects their profitability and stock performance. Additionally, in India, current oil prices positively impact pharma and commodity stocks.

The study highlights the varying effects of oil prices and geopolitical risks across different sectors and countries. While oil prices have a positive impact on sectoral returns, geopolitical risks tend to negatively affect banking stock returns, with specific impacts observed in the USA, Australia, and India. This underscores the complex interplay between global economic factors and sector-specific stock performances.

This study's findings suggest targeted policy recommendations. For the banking sector, particularly in the USA and India, where *GPR* negatively impact stock returns, policies should focus on stabilizing the sector. This could include measures to manage market volatility and protect against economic instability. Additionally, enhancing investor confidence through transparent communication

and risk mitigation strategies is crucial. For sectors positively influenced by current oil prices, policies should support these industries' growth. Diversifying the economy and reducing reliance on volatile sectors can also provide a buffer against global economic fluctuations.

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