



Impact of Crude Oil Prices on Interest Rates, Money Supply and Share Prices in the QUAD Countries

Sharon Sunny Thomas^a, Dr. Aneesh K.A^b

^a Student, Christ (Deemed to be University) Delhi NCR, Ghaziabad, 201003, India.

^b Associate Professor, Christ (Deemed to be University) Delhi NCR, Ghaziabad, 201003, India.

ABSTRACT :

The Quadrilateral Security Dialogue, initiated in 2007 by Japanese Prime Minister Shinzo Abe, commonly known as the QUAD, is a strategic security dialogue between Australia, India, Japan, and the United States to work for a free, open and inclusive Indo-Pacific region. Although the primary objectives are to improve cooperation and security between the players, there is an inherent need to prioritize economic prosperity. A mix of three producer trading and one massive emerging market with complementary strengths in technology, healthcare, finance, and manufacturing can further stand to gain by reducing their ties and dependency on China. This paper aims to study the shift in Monetary Policies and Equity Markets in the QUAD countries due to the global changes in Brent Crude Oil Prices. The study examines the fluctuations and adjustments in the respective domestic economies due to global oil price variations. The study concludes that the change in oil prices significantly impacts the QUAD countries.

Keywords: QUAD, China, Brent Crude Oil Index, Stock Market, Monetary Policy

Introduction

The QUAD began as a "Tsunami Core Group" in response to the devastating tsunami of 2004, which brought together the four nations to swiftly mobilize and coordinate multilateral disaster relief and humanitarian assistance operations. The group was established to deal with the immediate challenges posed by the tsunami and was never intended to become permanent. When Australia withdrew from the QUAD in 2008, it ceased to exist. It was revived in 2017 against the backdrop of an increasingly assertive Chinese posture and the emergence of the idea of the Indo-Pacific as a single maritime zone (Kalyani S, 2022). The changing dynamics in Asia have put the west on high alert as China's BRI, along with the Debt Trap diplomacy, is seen as an immediate threat to world order as China under the leadership of President Xi Jinping is getting into conflicts with several nations, especially in the South China Sea.

The Indo-Pacific comprising at least 38 countries that share 44% of the world surface area and 65% of the world population and account for 62% of the world GDP and 46% of the world's merchandise trade, has the potential to become a powerful regional block if the South and Southeast Asia could be linked through the connectivity, maritime link, improved trade facilitation and other networks that would reduce trade costs. Despite differences in threat perception, risk tolerance, military capability, and strategic culture, cooperation among the QUAD countries is likely to deepen as long as China continues to challenge key aspects of the status quo liberal rules-based order that benefit all four as they have common interests in maintaining a stable balance of power in the region, freedom of the seas, an open rules-based economic order, to counter debt-trap diplomacy and to limit the use of coercion by a state to assert territorial claims (Lee, 2020).

There are numerous reasons to increase economic engagement within the QUAD nations; the four countries, with a combined population of over 1.8 billion people, represent a quarter of the world's population and over \$30 trillion in GDP. In 2018, trade between the four countries totalled more than \$440 billion, with nearly \$6 trillion in trade with the rest of the world (Kalyani S, 2022). Hence, there is also a need to analyse the individual economic characteristics of these countries to understand better how they react to international crises and shocks that arise from time to time.

The price of oil is one of the most important global macro indicators. Quoted by almost all news providers around the world, it serves as a barometer for economic perspectives, movements of currencies, inflation, and political unrest in the Middle East. Despite more ambitious climate goals, the development of electric cars, and the widespread use of renewable energy production sources, oil remains to be the most important global commodity. Recent decades have been characterized by dynamic changes in the crude oil market. For example, oil demand in emerging (developed) markets significantly increased (decreased), the role of OPEC in setting oil prices crucially diminished, new sources of oil supply (especially shale oil) gained in importance, and a process of financialization made oil a non-negligible investment asset (Lang & Auer, 2020). Brent crude and West Texas Intermediate (WTI) are major indices for purchases of oil worldwide, among others such as the OPEC basket. Brent is traditionally a European index, whereas WTI representing slightly sweeter and lighter crude, is more applicable in the USA. Until 2010, the spread between WTI and Brent has not been more than a few dollars. However, in recent years, the spread is widening in favour of Brent and then returned to the mean. WTI, which has historically taken over Brent, has fallen below Brent which is now claimed to be the global oil index for the World (Berk, 2016).

This paper aims to study the shift in Interest Rates, Money Supply and Stock Markets in the QUAD countries due to the global changes in Brent Crude Oil Prices. The study examines the fluctuations and adjustments in the respective domestic economies due to global oil price variations which may be caused due to several factors like military conflict, political unrest and other shocks that might affect supply and demand in any manner.

Review of Literature

1.1. Benefits from the partnership - QUAD

The quadrilateral security dialogue, or "QUAD," was reborn in 2017 to secure a "rules-based order in the Indo-Pacific." Bringing together the U.S., Japan, India, and Australia, the QUAD was initially intended as a mechanism for responding to the 2004 Indian Ocean tsunami. India's commitment to the QUAD is complicated by its relationship with China and attachment to non-alignment (Envall, 2019). The first QUAD meeting, after its revival, happened on 12 November 2017, when the four 'like-minded' partners discussed seven key issues: the rules-based order in Asia; freedom of navigation and overflight in the maritime commons; respect for international law; enhancing connectivity; maritime security; the North Korean threat and non-proliferation; and terrorism (Jain, 2022).

A major challenge for broader cooperation remains to find practical ways to deploy the QUAD to support the regional order. The risk is that this would trigger accusations of containment. Already, the QUAD is moving to cooperate on supporting regional infrastructure projects. The focus here should be on finding projects that better integrate the Indo-Pacific as a coherent maritime regional order (Envall, 2019).

There is growing agreement between Australia, India, Japan, and the United States that as China rises in Asia, the rules-based order needs strengthening and defending (Lee, 2020). Lee further states that, under the leadership of President Xi Jinping, China has become more assertive and ambitious, vigorously pressing its claims in the East and South China seas and promoting its BRI. While India is an outlier among the four states because of different perceptions of the threat China poses, this does not prevent the four states from cooperating more deeply on standard setting, diplomatic messaging, practical economic measures, and military cooperation, from sustaining the liberal rules-based order which has been beneficial to all of them. Together the four states can cooperate more deeply on standard-setting, diplomatic messaging, and practical economic measures to sustain a liberal rules-based order and incrementally build interoperability and other forms of military cooperation while bearing these limitations in mind. If China's ambiguous nine-dash line claim to the South China Sea were to be enforced, that jurisdictional claim over the maritime commons would severely impede access to what are now considered international waters under international law. This would affect not only free trade but also the ability of the United States to support its alliance partners or play a balancing role militarily. The increased strength and frequency of U.S. freedom of navigation patrols in the South China Sea are as much about defending the principle as they are about maintaining the credibility of the U.S. commitment to allies and partners.

However, the region faces complex challenges in terms of economy, security, and the environment. The quadrilateral alliance between the United States, Japan, Australia, and India shows that although a substantial economic gain, whilst South and East Asia joined with the Indo-Pacific cooperation, the economic benefit would be enormous. The trade transaction cost is one of the major trading barriers prohibiting the growth of Indo-Pacific intra-regional trade. The study reinforces that improvement in infrastructure and connectivity that leads to lower trade transportation costs should be a necessary step to realize Indo-Pacific trade potential (Rahman, Kim, & De, 2020).

All four states are committed to the current rules-based economic order in the Indo-Pacific. This is based on free trade, open investment environments, open competitive tendering, the rule of law, and standards of good governance from which all continue to benefit. For all four countries, China's BRI is increasingly understood as more than just a mutually beneficial connectivity and development project, as Beijing claims, but also a means by which China is extending its sphere of influence and undermining the current economic order as it does so. All four of the QUAD countries agree that recent Chinese policies and actions are a threat to their common interests. However, there are clear divergences between the QUAD states, and these are important for the prospects of effective QUAD cooperation (Lee, 2020).

They should also cooperate on standard setting and create an Indo-Pacific quadrilateral critical infrastructure funding scheme as a viable alternative to China's BRI for small states that could be targeted by China for power projection purposes (Rahman, Kim, & De, 2020).

India's strong economic ties with the QUAD economies are reflected in its bilateral trade volume with each member. During 2019-2020, these three economies accounted for 15% of India's total trade. The United States contributes the most, with 11%, followed by Japan and Australia, with 2.15 and 1.6 percent, respectively. Further, India already has a free-trade agreement with Japan, which was implemented in 2011, and negotiations with Australia and the United States are ongoing (Kalyani S, 2022).

1.2. Importance of Oil Price Indices

OPEC is a basket composed of Arab, Basrah, Bonny, Es Sider, Girassol, Iran, Kuwait, Marine, Merey, Murban, Oriente, and Saharan Oil. These indices are used while pricing oil, so they have importance for international oil trade. Other crude oils are priced against major indices such as Brent, WTI, and Dubai. Technically, WTI is the best quality oil among these. However, this is just a slight difference in quality, which means WTI should trade a few U.S. Dollars premium to Brent. This is a lightweight and low-sulfur oil. This means that when refined, it could generate Brent, represents a European index, and is often characterized by the North Sea. The oil is in very different locations. The oil is still known to be light and sweet; however, WTI is lighter and sweeter. We know from the law of one price that the price differential should be equal, and otherwise, arbitrage opportunities arise. This is true. However, it is the supply and demand conditions and the location differences as well as political risks (Berk, 2016). OPEC decisions affect changes over time and depend on production decisions, and oil prices OPEC is less influential when prices are high and unconventional resources are viable. We find that the impact of OPEC's announcements on oil prices (1) evolves over time and among decisions, (2) is more significant for production cut and maintenance, (3) is different for WTI and Brent prices, and (4) is sensitive to the benchmark index. Moreover, OPEC's decisions depend on the exploration and extraction cost of more expensive/unconventional oil resources (Loutia, Mellios, & Andriosopoulos, 2016).

Historically, Brent and WTI have traded very close to each other; the spread almost means reverted to zero level until 2010. There are many reasons, but to tell the result, WTI has lost value against Brent and nowadays recovered a bit. The most important considerations are supply related and geostrategic. The U.S. also started to switch to alternative and modern ways of using energy (Berk, 2016).

Brent crude is statistically an excellent indicator of the energy industry in the short run. Brent traditionally is a better global benchmark, although once taken over by WTI (Berk, 2016). This means Brent crude is now more reliable in representing the oil industry. WTI, being an American index from the Texas region, fails to represent the energy industry, states Berk. This is an early warning signal for the USA, and there is a lot to do for marketing and balancing the supply for WTI, which despite its superior quality, loses market penetration. There is no relationship between oil and the energy industry in the long run; this is partly because of the long extraction and refinement period for crude oil (Berk, 2016).

Scientific research has made substantial progress in its quest for a better understanding of the causes and consequences of oil price movements and changes in the general behaviour and structure of the oil market. Shale oil production has caused the price of oil to be contained in a natural corridor which makes the oil price "explosions" that were observed several times in the past almost impossible in the future. The popular view that the financialization of crude oil markets was responsible for recent oil price spikes has been demolished. Even though the increase in the traded quantities of derivative financial instruments (especially through index funds) created an environment in which speculation might have become a major determinant of crude oil prices, research has shown that prices are primarily determined by changes in economic fundamentals, financialization has rather positive effects on the market (i.e., reduced hedging costs) and regulation of capital flows in derivative markets would be an inadequate policy reaction to the new market situation. Recent contributions highlight the high potential in, for example, spread-based forecasting models using industry-level data for refined products and that approaches dynamically exchanging (fundamental) explanatory variables over time are quite powerful. Even though crude oil (similar to gold and silver) has become an important component of diversified investment portfolios,¹³⁷ research on the investment properties of crude oil is limited. Thus, next to the research directions outlined in each chapter of our review, future research may better illuminate the investment potential of crude oil (Lang & Auer, 2020).

In oil importing countries, such as the United States, Western European Countries, China, Japan, and South Korea, the crude oil price has an important role in their economy, especially in their transportation and manufacturing sectors (Nademi & Nademi, 2018).

Therefore, the oil shocks have a significant impact on the world. Crude oil prices can suddenly move in reply to shocks from supply disruptions or political reasons. Evidence has been found of switching between regimes in the crude oil prices by investigating the plots of sample paths. The step functions show that crude oil prices are characterized by regime switching, where prices alternate between increasing and decreasing states (Nademi & Nademi, 2018).

1.3. Influence of Oil Prices on Monetary Policy and Economy

Crude Oil, as an important commodity, is a key input to all countries' production and a key output of many economies, so fluctuations in oil prices have influenced the world economic and financial markets (Wang, 2020). Many academic economists are concerned about the relationship between oil prices and economic activity, and they find considerable consequences of oil price fluctuations on economic activity (Wu & Ni, 2011).

These findings are of interest to policymakers as well as hedging strategies of crude oil portfolios and provide insight into long-term movements of crude prices. Co-movements of crude oil prices and markets have long been focused on in energy-related literature. In the last decade, crude oil prices have been subject to strong upward trends and crash-like downward spirals with high volatility, driven by global demand and supply changes, the global financial crises and their aftermath, and military and political conflicts (Klein, 2018).

Low price and high-income elasticities of demand and rigid supply explain high price volatilities and producers' market power. Exchange and interest rates do influence oil market equilibrium. The relationship between oil prices and interest rates is a two-way relationship that depends on the type of oil shock. During a supply shock, rising oil prices caused interest rates to increase, whereas, during a demand shock, falling interest rates caused oil prices to rise. This paper analyses the relationship between monetary policy and oil prices and shows that an oil demand shock caused by record-low interest rates led to exorbitant price increases. More specifically, monetary policy, conducted through changes in interest rates and monetary aggregates, has a significant and protracted effect on aggregate demand for goods and services as well as on asset prices such as exchange rates, housing prices, and stock prices (Krichene, 2006).

While earlier research was conducted under the assumption that it is possible to assess the impact of higher crude oil prices without knowing the underlying causes of the oil price increase, a now established view is that oil prices are not determined primarily by political events in the Middle East, but an endogenous perspective helps in explaining why some oil shocks affect the economy and stock markets, whereas others do not (Lang & Auer, 2020).

On understanding the dynamics of volatility spill overs among crude oil and international stock markets, the total spill over is time-varying and is mostly driven by the transmission of shocks in the short term (one week), suggesting that shocks to any market generally can be transmitted to other markets within one week (Wang, 2020).

Moreover, the low-interest rate is the primary driver of volatility spill overs, whose roles mainly stem from its impact on short-term spill overs. The impact of interest rates on long-term spill overs is significantly positive but relatively limited. Although the low-interest rate offers anticipation of the stability of the financial system, in the long run, it can be a source of global system risk, especially in the short run. Regarding individual direction spill

overs, we also generally observe that short-term spill overs are much more sizable. Interest rates have a significant negative effect on volatility spill over. The source of interest rates' role in volatility spill over mainly stems from their ability to impact short-term spill overs. Meanwhile, for policymakers, central banks should take into account financial stability concerns when making monetary policy decisions. Specifically, the possible benefits of a low-interest rate policy must be considered alongside its potential costs. Although the policy of low-interest rates offers cheap money and excess liquidity, and thus anticipation of the stability of the financial system, in the long run, it can be a source of global system risk, especially in the short run (Wang, 2020).

Sharp increases in the price of oil are generally seen as a major contributor to business cycle asymmetries. Moreover, the very recent highs registered in the world oil market are causing concern about possible slowdowns in the economic performance of the most developed countries. Because high energy costs lower firms' profits and they normally reduce the willingness to purchase new capital goods; however, if the increase in energy prices looks to be permanent, firms might decide that it makes sense for them to invest in more energy-efficient capital, moderating the decline in their capital spending. Hence, in the long-run high energy costs may induce firms to reduce their investment in new capital or cause the existing capital stock to become economically and technically obsolescent. Therefore, there could be a reduction in the productive capacity of the economy of industrialized countries. Moreover, if consumers expect a temporary rise in energy prices, they could decide to save less or borrow more, causing a fall in real balances and a further increase in the price level. Another channel through which oil price shocks could influence economic activity is the income transfer from oil importing countries to oil-exporting nations (Cognigni & Manera, 2008).

While the interrelation between oil price changes, economic activity, and employment is an important issue that has been studied mainly for developed countries, little attention has been devoted to inquiries on fluctuations in the price of crude oil and its impact on employment for small open economies. Adopting an efficiency wage model for equilibrium employment that does not require any assumptions regarding labour supply, causality between unemployment and two input prices, namely energy (crude oil) and capital (real interest rate) in an emerging market was investigated (Doğrul & Soytaş, 2010).

Rising oil prices can be thought of as a tax levied from oil-exporting countries to oil consumers. In this case, a reduction in real money balances has negative effects on household wealth and, consequently, on consumption and output. Moreover, there will be a 'liquidity preference' effect, as people tend to rebalance their portfolios towards liquidity. If the monetary authorities fail to meet growing money demand with an increased money supply, real balances will decrease, and interest rates will increase. The risk from this approach is that there could be a direct effect on prices. In this case, however, the continuing inflationary potential from the oil price shock would not be reduced (Cognigni & Manera, 2008).

Studies on oil price shocks to economic variables such as GDP, interest rates, inflation, and industrial production are prevalent, but only some studies have focused on external shocks to the possible reaction of monetary policies. The monetary policy might take time to be effective, so the concerns of lag-chosen issues will be vital issues from the aspect of this research. Then, different lag-chosen criteria and symmetric and asymmetric lag lengths chosen are placed in a stressed situation in this study with regard to monetary lag concerns. The empirical results are quite robust concerning various lag-chosen criteria, symmetric and asymmetric models, and different time series models. So, it implies that monetary policies still matter after accounting for the oil prices, the energetic variable, with the above robustness concerns, there is a close relationship between oil prices and real-world activity. Therefore, it stimulates our interest to study the issues about oil prices and whether the Fed's policies could affect real activity caused by oil price shocks (Wu & Ni, 2011).

Wu et al. use variables such as M2 and interest rates on short-term U.S. treasury bills to study the effect of Crude Oil Prices on the economy.

1.4. Impact of Crude Oil Prices volatility on the Stock Market and Interest Rates

The findings of Wen et al. support a positive crude oil-emerging stock market link overall. The regression results show that oil return volatility, country-specific variables (i.e., stock market volatility, petroleum production growth), and U.S. economic policy uncertainty have positive effects on oil-stock dependence. However, a strong U.S. economy tends to decrease the oil-stock dependence. The performance of the stock market is generally believed to be negatively correlated with oil prices, considering that higher oil prices indicate rising transportation, production, and heating costs, which can place a drag on corporate earnings and drive-up inflation and consumer spending. With a growing literature documenting that the oil price is impacted by U.S. and global macroeconomic conditions and that emerging economies are more integrated into the world economy. Not distinguishing different oil price shocks, market circumstances, or country types, we straightforwardly use the observed prices of crude oil and each emerging stock market index to characterize their dependence strong U.S. economy, and the U.S. quantitative easing policy is expected to increase the diversification benefits. Most importantly, the obviously pronounced positive linkages between crude oil and emerging stock markets echo concerns about the increasing exposure to the oil price risk of emerging stock markets, and the significantly intensified market linkages during the financial crisis period emphasize the need for operations to keep stock markets stable and less volatile in the face of high oil price risk (Wen, Bouri, & Cheng, 2019).

An efficient market correctly uses all relevant information in setting prices (Fama, 1975). Conversely, such results also indicate that emerging stock markets should be an additional risk factor when analysing the crude oil market risk. For more specific regulatory decision-making, the volatilities of crude oil and stock markets, the US EPU, and the petroleum production growth can be regarded as warning signals for unstable emerging stock markets or the crude oil market. With a strong U.S. economy, the crude oil emerging stock market linkage weakens, indicating lower oil price risk; however, in this case, more funds are expected to flow away from the emerging markets, and the emerging stock markets could be trapped in a slump, which should be another concern for policymakers (Wen, Bouri, & Cheng, 2019).

The short-term rate of interest is fundamental to much of theoretical and empirical finance, yet a consensus has yet to emerge on the dynamics of its volatility. The sensitivity of interest rate volatility to interest rate levels has been overstated in the literature. While this relationship is important, adequately modelling volatility as a function of unexpected information shocks is also important. This makes the choice of a model for short-term rates crucial to pricing bonds, pricing interest rate derivatives, and hedging interest rate risk. For example, to price long-dated derivatives such as swaps, swaptions, or embedded bond options correctly, we need to model both the instantaneous and time series properties of interest rate volatility (Brenner, Harjes, & Kroner, 1996).

The significance of nonlinearity in the short-rate drift declines with increasing maturity for the interest rate. The dynamics of the short-term interest rate constitute the key building block in asset pricing (Bali & Wu, 2006). Chan et al. claim that the results of the tests for one-month Treasury bills indicate that it is critical to model volatility correctly. The models that best describe the dynamics of interest rates over time are those that allow the conditional volatility of interest rate changes to be highly dependent on the level of the interest rate (Chan, Karolyi, Longstaff, & Sanders, 1992).

Mankiw et al. conclude that long-term interest rates do not overreact to either the level or the change in short-term rates. This finding suggests that participants in bond markets are not myopic or overly sensitive to recent events. It is of interest to financial economists because of its close connection with the pricing of bonds of different maturities (Mankiw & Summers, 1984).

More important, understanding the term structure of interest rates is also critical to the evaluation of the effects of alternative macroeconomic policies. It is widely believed that the monetary authority can most directly control short-term interest rates, but that aggregate demand depends primarily on long-term interest rates. If this conviction is correct, the monetary transmission relies on the behaviour of the term structure of interest rates. (Mankiw & Summers, 1984).

Research Objectives

- To study the impact of Crude Oil Prices on Short and Long-term interest rates, Money Supply, and Share Prices in QUAD countries.
- Explore the potential implications of the findings for policymakers in the four countries regarding energy and monetary policies.

Methodology

This study was conducted using secondary data from reliable sources like the U.S. Energy Information Administration, the Organization of the Petroleum Exporting Countries, and the Organisation for Economic Cooperation and Development. The analysis was run on Short-term interest rates, Long term interest rates, Narrow Money (M1), Share Prices, and Crude oil prices of Brent index data for Australia, Japan, India, and the United States of America from January 2012 to September 2022. A panel data model was built on R statistical software to run and interpret the results as the study aims to identify the variation among four countries that span across a considerable time period. The presence of monthly data ensures accuracy, and even the small variations go unnoticed as the changes in interest may be very less in comparison to prices.

Table 1 – Data Sources

S.NO	Variable	Unit	Source	Time Period	Countries
1	WTI	US Dollars per Barrel	U.S. Energy Information Administration	January 2012 – September 2022	Australia, India, Japan, and USA
2	Brent	US Dollars per Barrel	U.S. Energy Information Administration	January 2012 – September 2022	Australia, India, Japan, and USA
3	OPEC	US Dollars per Barrel	OPEC	January 2012 – September 2022	Australia, India, Japan, and USA
4	Short-term interest rates	Percentage	OECD	January 2012 – September 2022	Australia, India, Japan, and the USA
5	Long-term interest rates	Percentage	OECD	January 2012 – September 2022	Australia, India, Japan, and USA
6	Narrow Money – M1	U.S. Dollars	OECD	January 2012 – September 2022	Australia, India, Japan, and USA
7	Share Prices	Index	OECD	January 2012 – September 2022	Australia, India, Japan, and USA

Results and Discussion

The major crude oil indices for the time period 2012 – 2022, with monthly data aggregated to year was plotted to see how they differ from each other.

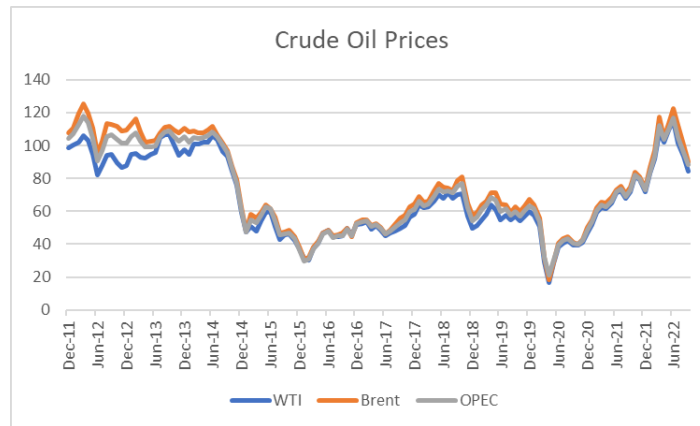


Fig.1 – Crude Oil Prices

Figure – 1 show that Brent is priced higher in comparison to the rest, with OPEC as the second most expensive, which is a major discourse from the literature review which suggests that WTI is priced higher but the notion that Brent Oil Index is stable holds true. It is because the literature dated 2010 in prices of WTI. Figure – 1 suggests that WTI prices took a hit after 2011, and Brent was expensive of the lot. There is a very similar response to shocks as all three seem to move in sync, and also some points closer to convergence for most of the years. The dip in 2015 suggests a drop in prices as a result of the shock from Russia's annexation of Crimea and the resulting sanctions. COVID-19 caused a significant drop in prices which is evident from Figure – 1 as the prices tanked in 2020, making a sharp recovery past 2021 as a result contributing to the rise in prices in post COVID world where demand for oil skyrocketed.

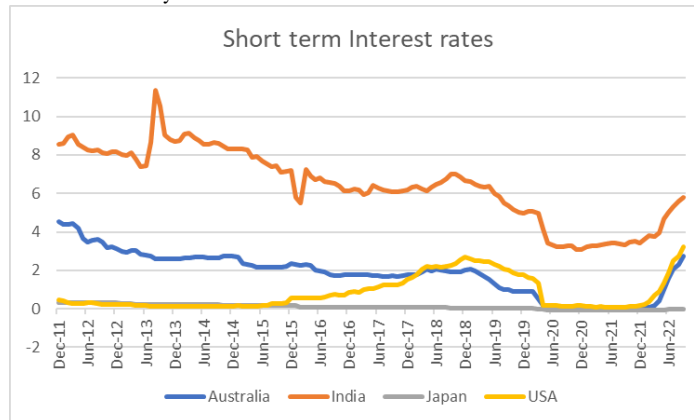


Fig.2 – Short term Interest rates

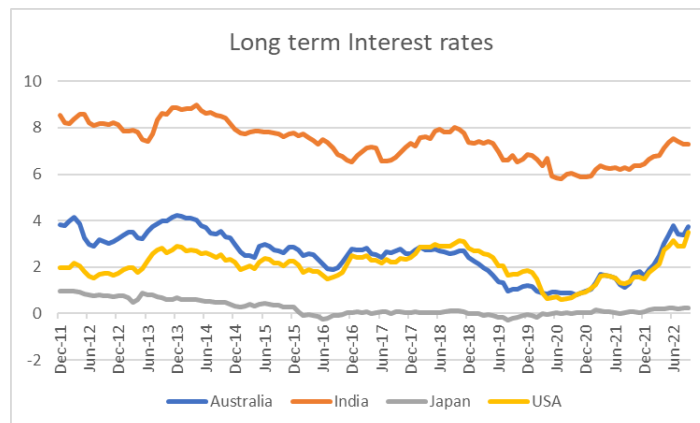


Fig.3 – Long term Interest rates

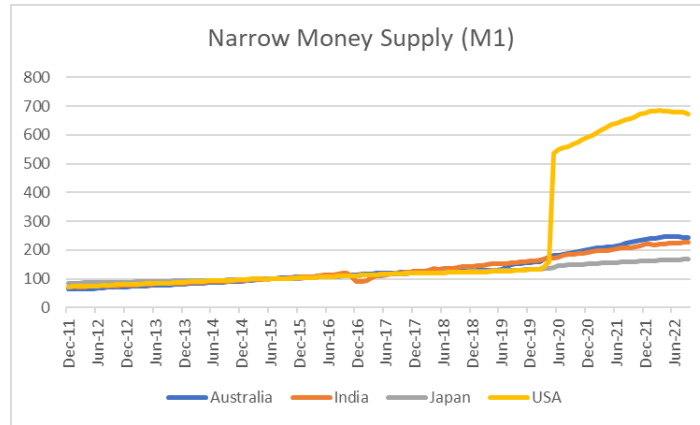


Fig.4 - Narrow Money Supply (M1)

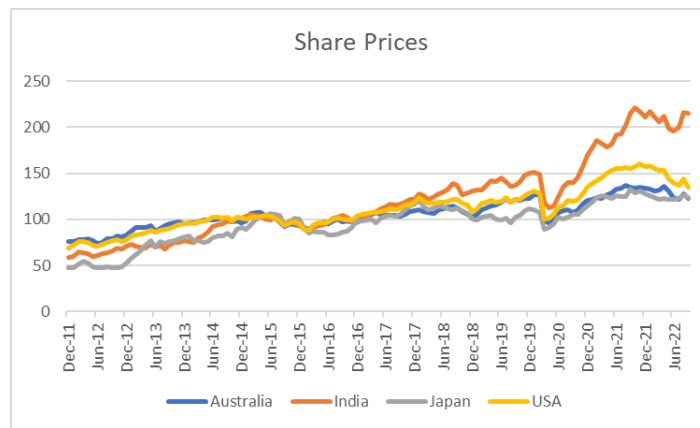


Fig.5 – Share Prices

From figures 2, 3, 4 and 5 the independent variables movements are very different for each country given the economic policies implemented in these countries and they are standardized using z-score method since they are in different units. We then proceed with the panel data analysis for the given set of countries.

1.5. Panel Data Analysis

As established by the literature review, Brent Index is considered a stable measure of oil prices as it includes a basket of countries, unlike WTI, and is relatively independent and free, unlike OPEC. Hence, we consider Brent Crude Oil Index as a dependent variable, and Short and Long-term interest rates, Narrow Money (M1), and Share Prices in QUAD countries have been considered independent variables.

In order to establish relevant method panel data analysis we first test for multicollinearity using the Variance Inflation Factor for the variables and the results are as follows.

Table 2 – Test for Multicollinearity

Variables	VIF
Short term Interest rates	3.100916
Long term Interest rates	2.477118
Share Prices	4.137666
Narrow Money	5.208705

From Table we see that the VIF values are high, which proves the existence of multicollinearity in the data and since we have time varying variables we opt for Fixed Effects Panel Data estimation to control for external factors.

A panel data analysis was conducted using R statistical software using the following equation,

$$\text{Brent Crude Oil } it = \beta_1 + \beta_2 \text{ Short-term interest rate} + \beta_3 \text{ Long-term interest rate} + \beta_4 \text{ Narrow Money} + \beta_5 \text{ Share Price} + \epsilon_{it}$$

1.6. Fixed Effects Estimator

As prevalent from the Hausman test, where it fails to reject the null hypothesis, it confirmed that Fixed Effects Estimator is the significant method for the given data.

Table 3 – Fixed Effects Estimates

Variables	Estimates	Std. Error	t - value	Pr(> t)
Short term Interest rates	-0.152650	0.056958	-2.6800	0.007599 **
Long term Interest rates	0.845118	0.050908	16.6009	< 2.2e-16 ***
Share Prices	-0.329166	0.065795	-5.0029	7.774e-07 ***
Narrow Money	0.480823	0.073821	6.5134	1.758e-10 ***

Table 4 – Model Summary

Measures	Values
Total Sum of Squares	516
Residual Sum of Squares	276.4
R-Squared	0.46433
Adj. R-Squared	0.45701
F-statistic	110.955
DF	4 and 512
p-value	< 2.22e-16

The p-values are significant for all independent variables, which means the dependent variable explains all of the independent variables and is statistically significant. There exists a negative relationship between Crude Oil Prices and both Short-term interest rates and Share Prices, as seen from the Coefficients. While Share Prices are affected to a small extent, we see a considerable effect on short-term interest rates.

There also exists a positive relationship with Narrow Money to some extent and a very significant effect on long-term interest rates. This suggests that Brent Crude Oil prices impact both Short-term and Long-term interest rates and, in turn, play a major role in setting interest rates and executing Monetary Policy, while Narrow Money supply increase suggests the injection of cash into the system to manage the Demand for Money that may arise from speculation and precaution of increasing oil prices which translates to high inflation.

As established by the literature review, the Stock Market seems to have a negative impact by increasing prices due to fears of inflation in the economy.

Research Gap

Although the literature on Crude Oil prices and studies on how they interact with monetary indicators like Inflation, GDP, and Unemployment are prevalent, literature on their impact on Short and Long-term interest rates, Narrow Money (M1), and Share Prices in QUAD countries have yet to be widely reported. The emergence of China has put the alliance in the spotlight, and there is a need for greater economic cooperation among the member nations. Hence, this study aims to shed light on the nature of these economies by analyzing the policy and stock market response to a global shock.

Limitations

The study was carried out using secondary data. Oil prices may be affected by government interventions, supply shocks, and military conflicts. The US being the contributor to WTI Index and U.S. Dollars being the primary global reserve currency may affect the study as they can influence domestic policies and therefore cause spill overs globally.

Conclusion

Although with the ongoing climate crisis and governments aiming to cut down the use of Crude Oil and other fossil fuels, they are poised to stay relevant and continue to influence and impact economies for the next few years while we discover new green alternatives. There is a need for QUAD countries to develop infrastructure in the Indo-Pacific to sustain power and keep China at bay. Investing in infrastructure that is green, sustainable and provides renewable sources of energy can be a great strategy for establishing control while also taking steps to fight the climate crisis, achieve Sustainable Development Goals and reduce the reliance on oil which seem to influence Monetary Policies and the Stock Market in QUAD countries.

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