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Nexus between oil price and stock market development in Southeast Asian economy: Evidence from linear and nonlinear assessment

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Abstract
The literature has extensively investigated stock market development and its critical role. Another variety of studies focuses on determining the factors responsible for stock market development. The motivation of the study is to investigate the impact of oil price movement on stock market development in the Southeast Asian economy for the period 1990-2020.study applied several economical tools such as the second-generation panel unit root test widely known as CADF and CIPS, panel cointegration test with error correction term, panel ARDL and nonlinear ARDL. Study findings have revealed that oil price prices are negatively associated with stock market development both long-run and short-run. The nonlinear assessment established a long-run asymmetric association between oil price and stock market development. Refers to asymmetric elasticity, the study documented a negative and statistically significant linkage between asymmetric shocks of oil price and the measures of stock market development.

Keywords: Stock Market Development, Oil Price, ARDL, Nonlinear ARDL, Southeast Asia

1. Introduction

Stock market development's (SMD) impact on economic growth is a fascinating issue that has been discussed in numerous empirical research. In general, the stock market's evolution is critical for economic progress. As a result, several governments have created policies to stimulate the evolution of stock exchanges to promote economic growth. To successfully devise and execute these policies, a solid empirical study of the stock market's influence on economic growth is required. Theoretical models of its influence, on the other hand, are hazy. The vast majority of them have only highlighted the influence of financial development, i.e., the banking sector, on economic growth. Meanwhile, the credit market would be impossible to function properly without the stock market. This is still a problem that is seldom addressed in empirical investigations. Furthermore, there are opposing viewpoints in the present research. Furthermore, this has received scant attention in empirical research in Asia, particularly among the EMDEs (developing market economies in transition). Their low or medium-income but quick economic development, and notably the adoption of a free-market system for stimulating economic growth, are common elements (Andriamahery and Qamruzzaman 2022, Zhuo and Qamruzzaman 2022) [9, 10]

The stock exchange's significance cannot be emphasized. The stock market may make it easier to invest in the most productive technology by lowering the cost of mobilizing funds. The stock market may also be affected by helping with capital distribution by allowing durable initiatives with long-term remuneration to be implemented. Furthermore, Market liquidity is provided by the stock market, allowing investors to trade financial assets in a less hazardous manner and enabling businesses to obtain funds quickly. The growth of the stock exchanges may help to strengthen by addressing the main issue of corporate governance. The interests of managers and owners are often aligned in stock markets, which motivates supervisors to try to increase the worth of their companies.

Furthermore, well-developed Stock markets encourage worldwide risk-sharing, enabling global to create a portfolio that moves from lower-risk low-yield assets to higher-risk high-return assets. For further information, see;

(Bencivenga and Smith 1991) [12] (Greenwood and Jovanovic 1990, Akinlo 2014, Fang and Qamruzzaman 2021, Md 2021) [22, 5, 10, 42]. Several contributions may be linked to established stock markets. According to existing literature, Stock investment is a kind of long-term savings that is directly invested in manufacturing activities (Levine and Zervos 1996) [38] and Return maximization and resource efficiency are rewarded in developed markets, and they are the seeds that start a cycle of growth and competition. Finally, a well-functioning stock market is critical for recruiting, maximizing, consolidating, and maintaining outside capital (Nieuwerburgh, Buelens *et al*. 2006, Khan, Teng *et al*. 2021) [46, 35].

Because of its significance, Several increasing studies have been conducted to investigate the connections the difference between the stock market and other elements of the economic system (Garcia and Liu 1999, Yartey 2010, Ho and Njindan Iyke 2017, Ibrahim 2021, Qamruzzaman, Tayachi *et al*. 2021, Chiad and Sahraoui 2022) [20, 66, 21, 10, 16]. The study of Igwilo and Sibindi (2022) [28], see, for example, has investigated the impact of ICT adaptation on stock market development in the African economy. Study findings postulated that ICT adaptation positively influences stock market development in the long run. The stock market's determinants may be divided into three categories: Factors affecting macroeconomics: Economic growth, development of the banking industry, inflation rate, and interest rate, currency private capital flows are increasing at a rapid pace, all macroeconomic elements to consider(Hajilee and Al Nasser 2014, Mia, Qamruzzaman *et al*. 2014, Borteye and Peprah 2022) [24, 10, 15]. In detail, the legal foundation, legal protection, corporate governance, financial market emancipation, stock market integration, and trade openness are all industrial variables (Al-Faryan and Dockery 2021, Sharma, Shahbaz *et al*. 2021) [6, 59].

According to a large body of empirical data, oil price increases have severe negative consequences for oil-importing economies. According to the statistics, stronger oil price growth is often connected with higher GDP growth. Oil price growth and inflation are also strongly correlated (Alamgir and Amin 2021, Asaad 2021, Khan, Teng *et al*. 2021) [7, 11, 33]. Although inflation rises a few quarters after oil prices rise, it does so with a lag of a few quarters. Additionally, a greater oil price rise is linked to better fiscal revenue growth. Petroleum-related income tends to be high during high oil prices and low oil prices, and they tend to diminish during periods of low price oil. The association between the stock market and oil price is feeble, and this research will look into it further. According to recent research, they mostly have a negative association (Akinlo 2014) [5].

The impact of demand and supply on the stock market is in the red rather than the green manner will also be discussed since the nature of business in these nations is heavily reliant on the quantity of oil used, resulting in a discrepancy in the outcomes our primary worry. The motivation of the study is to investigate the impact of oil price movement on stock market development in the Southeast Asian economy for the period 1990-2020.study applied several economical tools such as the second-generation panel unit root test widely known as CADF and CIPS, panel cointegration test with error correction term, panel ARDL and nonlinear ARDL. Study findings have revealed that oil price is negatively associated with stock market development in both the long and short run. The assessment established a long-run asymmetric association between oil price and stock market development. The remaining structure of the study is as follows. Section II deals with the literature survey, the data, and the study's methodology displayed in Section III. Model estimation and interpretation displayed in Section IV and Section V deal with the study's conclusion.

2. Literature survey of the study

Coal has fueled industry's forges and equipment from the beginning of the industrial age till the post-industrial era. The attention has now switched to crude oil (petroleum, diesel, petrol, octane, etc.). Many of the machines we see today are powered by oil and petroleum, but not every country produces oil, such as Iraq, Saudi Arabia, or Syria, and as a result, the rest of Asia and Europe that lacked oil as a national resource were solely reliant on oil-exporting countries, and many industries around the world became dependent on crude oil production from these countries. Oil exporting nations formed coalitions and controlled import flows and prices via various organizations and syndicates, including OPEC (Oil Producing and Exporting Countries). Conflicts and other macroeconomic reasons, on the other hand, had an impact on the global economic landscape, resulting in an epic drop in the price of crude oil in September 2014, which is still at an all-time low. While this cast a pall over oil-exporting and oil-dependent economies and nations, it was a boon for oil-importing countries like Bangladesh, who could suddenly purchase oil for less than water. Oil-importing nations took advantage of the potential to boost their economies by vying for internationally exported products and consumer goods produced by an industry reliant on oil prices (Qamruzzaman 2014) [10].

The impact of oil price fluctuation on the economy of the actual stock market negatively influences profits since it reduces productivity, such as production in industry and employment growth. As an Asian nation, Stock prices and oil prices markets have a negative and skewed connection (Imarhiagbe 2010) [29]. Stock markets, oil prices, and the impact oil prices have on the stock market, which impacts future cash flow, are all seen as having a direct link. Because there are no full substitution effects between the elements on which production is dependent, the cost of doing business rises, while non-oil-related enterprises' earnings fall (Abraham 2016, Shirodkar 2017, Guntur, Shirodkar *et al*. 2021) [1, 62, 23] provided a general summary demonstrating that nations such as Japan and the United States of America mutually harm the stock market and oil prices. If the price of oil rises, this is a good thing. It hurts the stock market, indicating that the two are inextricably linked (Beşel 2017, Agbo 2021) [14, 4].

When oil prices fluctuate, earnings may either fall or rise dramatically. The influence of oil prices on a country's economy fascinates many people, particularly economists. As a result, the link between oil price fluctuations and stock market returns in the two oil-importing countries, Pakistan and India, is very important. Oil has played a critical part in forming the development of nations, especially emerging countries that rely on their oil supplies to operate their economies. In these nations, for example, Oil price fluctuations directly influence the common person, making a living more difficult (Abuzayed, Molyneux *et al*. 2009) [2]. According to the literature, this link has a detrimental impact on oil prices and the worldwide market ((Malik 2008, Hassan and Zaman 2012, Yasmeen, Wang *et al*. 2019) [40, 25, 61]. In a

study El Hedi (2006) [18] revealed compelling evidence that fluctuations in oil prices predict market returns. (Najaf 2016, Malik, Ajmal *et al*. 2017, MEHTA, QAMRUZZAMAN *et al*. 2021) [45, 41, 10]

However, the economic situation in Bangladesh was as awful as it gets since the country's domestic oil price remained steady. The BPC (Bangladesh Petroleum Corporation) regulates oil prices, resulting in a monopoly on the price and supply of oil in Bangladesh. When questioned why, they said that they are keeping the price high since they previously provided advantages to Bangladeshi people in the form of subsidies and reduced oil prices, for which they suffered a significant loss. They are now taking advantage of this chance to recoup their losses and build a buffer for future subsidizing situations, if necessary.

Because Nominal exchange rates, stock prices, and oil prices are all intertwined, Oil prices are on the rise generally. Stock prices are influenced in a favorable and statistically meaningful way. This finding defies predictions based on the theory. In the last several years, the enormous impact of foreign exchange rates and oil prices on stock prices and interest rates in the United States and Russia has had a major influence on the stock market ((Ladislav, Rostislav *et al*. 2006) [37]. (Rodriguez and Sanchez, 2005) looked into it and found that exchange rates affect oil price oscillations, which affect the economy. According to several well-known experts (Gerben Driesprong and colleagues, 2004), economically, predictability is critical.

Nevertheless, it might also be extreme and inexplicable calendar anomalies or well-known economic indicators that predict stock returns. Prices tend to fluctuate over time and are difficult to anticipate. In addition, Hong and colleagues (Hong *et al*., 2002) discovered an unfavorable relationship between the rise and fall of oil prices and the rise and fall of the stock market. Various risk premiums in the multifactor market show that interest rates, currency exchange rates, and gasoline prices are all rising, the key drivers of returns on oil and gas stocks.

On the contrary, some analysts looked into a strong positive correlation between oil prices and stock performance in the industry of oil and gas, and then it was discovered that variations in oil prices have a chain impact on actual economic activity, referring to the close link they have if it is lucrative or not. These nations' initiatives are either low-cost or long-term, taking much longer than necessary. A faltering global economy will result in significant market shifts and increased volatility rather than making it more stable and safer. Sadorsky (2011) [56] established that the price of oil fluctuates had a detrimental impact based on stock prices. An oil price shock hurts stock, according to records, since it harms production and employment growth in these nations. According to several academics, Shocks in oil prices have a huge effect on aggregated economic activity. Price fluctuations in the oil market are projected to have differing impacts on oil-exporting and oil-importing economies (Amano and van Norden 1998, QAMRUZZAMAN, MEHTA *et al*. 2021) [8, 10].

In a study Wei, Li *et al*. (2019) [64] found that the Chinese currency exchange rate yuan versus the US dollar is the most widely used currency, an important element in transmitting the influence of oil prices In the Chinese stock exchange, especially after the financial crisis. In a multivariate framework, Ghosh and Kanjilal (2016) [21] investigate the nonlinear cointegration between the worldwide Indian stock market and crude oil prices. Their results imply that the influence of crude oil price shocks on the stock market is significant, not immediately transferred; rather, it is indirectly transmitted via the budget deficits, inflation, and currency depreciation. Are all factors to consider the rupee the currency of India. Ji, Liu *et al*. (2020) [30] add to the body of knowledge by looking at the relationship between stock returns and various oil shocks of various forms in the context of the BRICS (Brazil, Russia, India, China, and South. They find that the relationship is time-varying and that oil-specific demand poses considerable risk of spillover shocks in all BRICS nations' stock returns (Li and Qamruzzaman 2022).

3. Variables and Methodology of the study

The dataset contains monthly global Stock market indexes and oil prices for Bangladesh, India, Pakistan, and Sri Lanka, four South Asian nations and spans 1990 to 2020. Bloomberg provides data for stock market indexes, while the US Energy Information and Association website provide statistics for global oil prices (EIA).

3.1: Theoretical Framework

We build our model, as in previous works, on a theoretical level underpinnings APT stands for Arbitrage Pricing Theory, posits the linear connection that follows:

$$ri = \Lambda_i + \beta_i R + \boldsymbol{\Sigma}_i \quad (1)$$

Assessing the asset return's reaction, I assign a risk factor to each risk factor, and I amthe incorrect phrase for the returns' lingering influence.

Nonetheless, the diverse risk variables in our investigation are limited to solely oil price shocks. As a result, the simplified version of the APT shown in Eq. (1) is written as follows:

$$r_i = \lambda_i + \beta_i p + \varepsilon_i \quad (2)$$

where p denotes oil price fluctuations, which are defined as unexpected The price of oil fluctuates.

However, recent research suggests that Stock market returns and oil price shocks may be asymmetric: negative oil price shocks have a different effect than positive oil price shocks (Salisu and Isah 2017, Jia, Mehta *et al*. 2021) [58, 31]. As a result, we partition the oil price has shifted from negative to positive. And negative Price fluctuations in the oil market, resulting in the following modification of the 2nd equation:

$$r_i = \lambda_i + \beta_i p^+ + \beta_i p^- + \varepsilon_i \quad (3)$$

where p+ indicates, Positive oil price shocks are indicated by a, whereas negative oil price shocks are shown by a.

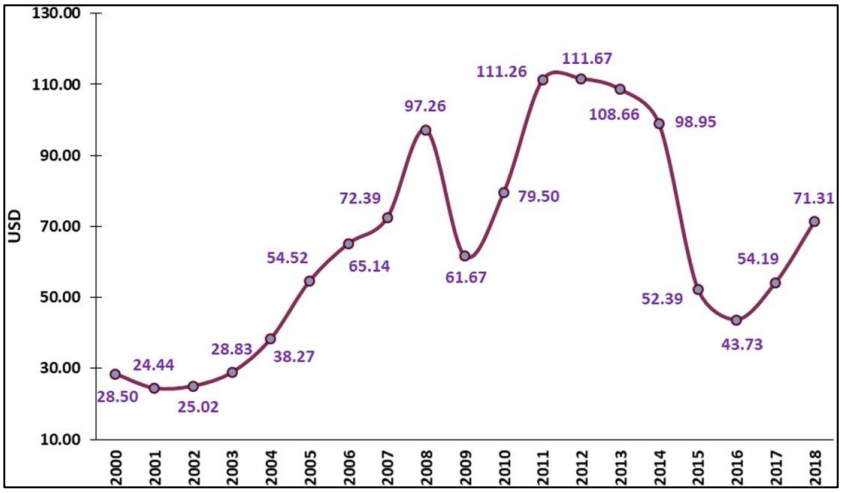

Fig 1: Volatility of Oil Prices in the Past. British Petroleum (BP), the year 2020.

Fig 1 shows how oil price changes over time. We can see that in the year 2000, the oil price was fairly low, USD 28.50, then it began to rise, and in 2009, it was at its peak of USD 97.26, after which it plummeted to USD 61.67 due to the financial crisis, after which it began to rise again, and the oil price became greater than the previous few years. However, it was unable to maintain the price, and it began sliding again in 2014, continuing to decrease until 2016. Finally, after 2016, it started increasing again and in 2018 oil price was USD 71.31.

4. Methodology of the study

A dynamic panel data model was used to investigate the link relationship between oil price and the stock market index. We develop a dynamic heterogeneous panel data model, a nonlinear Panel ARDL model suitable for investigations with high T, to capture within-group variations (Xia, Qamruzzaman *et al*. 2022) [10]. When using pooled OLS to estimate the suggested model, the coefficients will be homogeneous; the Fixed Effect estimator, on the other hand, will only allow the intercepts will change between groups. These estimators will give heterogeneous coefficient estimates that are inconsistent and deceptive. The Mean Group (MG) estimator, on the contrary, does not limit the cross-group constraints. Pesaran, Shin *et al*. (1999) [47] presented the estimator for the Pooled Mean Group (PMG), which includes Between these two extremes, both pooling and averaging are used. This estimator permits differences in the error variances, the intercept, and short-run coefficients over groups while requiring a subset of the long-run coefficients that should be identical. When it comes to the long-run homogeneity requirement The PMG estimator is valid on the coefficientsestimates that are consistent and efficient. After that, the usual Hausman Test is used to assess the adequacy of the two appraisers (Qamruzzaman, Tayachi *et al*. 2021, Andriamahery and Qamruzzaman 2022) [55, 9]

The MG estimator accounts for differences in short and long-term parameters across groups and intercepts. The MG estimator makes predictions an alternative slopes and intercepts in the long and short runs for n different nations and then compares all the parameters from the ARDL models (Pesaran and Smith 1995, Pesaran, Shin *et al*. 1999) [48, 47]. That is, if the ARDL model is correct. Correct.

$$r_{i,t} = \alpha_i + \beta_i r_{i,t-1} + \gamma_i p_t + \varepsilon_{it} \quad (4)$$

where rit is the for each stock market index, a log is kept. nation I I = 1, 2, 3..., N) for a time dated t (t = 1, 2, 3..., T), pt is the global price of oil at the time t, and i,t=error term. As a consequence, I will be calculating the long-run parameter for each country.

$$\theta i = yi\theta i = \frac{}{1 - \beta_i}$$

For the whole panel, MG estimators will be given by:

$$\hat{\theta} = \frac{1}{N}\sum_{i}^{N}\theta, \quad \hat{\alpha} = \frac{1}{\_}\sum_{i,}^{N}\alpha$$

On the other hand, the MG estimator is only valid and consistent for sufficiently large T. While the long-run coefficients must remain constant, the PMG estimator allows the intercept, short-run slopes, and error variances to change across groups. When the long-term homogeneity requirement is based on coefficients fulfilled, the PMG calculator generates consistent and efficient Estimates.

The Hausman test will then be used to assess one of the two models that is the most effective, the better estimator for the ARDL panel model estimator.

We begin our investigation of the stock-oil nexus by assuming that the market reacts. Symmetrically, as a result of fluctuations in oil prices, as follows:

$$\Delta rit = \beta 0i + \beta 1iri,t-1 + \beta 2ipt-1 + \sum_{}^{N1} + \sum_{}^{N2} \lambda ij\Delta ri,t-j + \gamma ij\Delta pt-j + \mu i + \varepsilon i,t \quad (5)$$

Where I denote the influence on a certain group. The long-run slope coefficient of every cross-section is - 2i, whereas the slope coefficient in the short term is

$$\beta 1i$$

The slopes of the runs are calculated asij.

The following is the prior equation's error correction re-parameterization:

$$\Delta r_{it} = \delta_i(r_{i,t-1} - \varphi_{0i} - \varphi_{1i} p_{t-1}) + \sum_{j=1}^{N1} \lambda_{ij} \Delta r_{i,t-j} + \sum_{j=0}^{N2} \gamma ij \Delta pt-j + \mu i + \varepsilon i,t \quad (6)$$

The variables 0i and 1i are calculated as - 10ii and - 12ii, correspondingly, and I am the error correction speed of adjustments.

ARDL, a nonlinear panel, is another option (NARDL) layout, which is an asymmetric variation of the panel ARDL model considers that the stock market's response to a positive oil price shock is not linear. The same as the stock price response to a negative oil price shock (Shin, Yu *et al*. 2014) [61]. Furthermore, The NARDL model is a reliable strategy because it is suitable for both long- and short-term forecasting, devoid of residual correlation and regressor endogeneity (Jianguo and Qamruzzaman 2016, Qamruzzaman and Karim 2020, Khaskheli, Jiang *et al*. 2021, QAMRUZZAMAN, MEHTA *et al*. 2021, Shahbaz, Sharma *et al*. 2021, Adebayo, Oladipupo *et al*. 2022, Qamruzzaman 2022) [32, 53, 35, 31, 59, 3, 10]. As a consequence, Eq. (6) has the following asymmetric form:

$$\Delta r_{it} = \beta_{0i} + \beta_{1i} r_{i,t-1} + \beta_{2i}^{+} p_{i-1}^{+} + \beta_{2i}^{-} p_{i-1}^{-} + \sum_{j=1}^{N1} \lambda_{ij} \Delta r_{i,t-j} + \sum_{j=0}^{N2} \gamma_{ij}^{+} \Delta p_{t-j}^{+} + \sum_{j=0}^{N2} \gamma_{ij}^{-} \Delta p_{t-j}^{-} + \mu_i + \varepsilon_{i,t} \quad (7)$$

Positive oil price shocks are denoted by p+t, whereas negative oil price shocks are denoted by pt, and they are computed as follows:

$$p^{+t} = \sum_{k=1}^{t} \Delta p_{i,k}^{+} = \sum_{k=1}^{t} \max(\Delta pi,k, 0)$$

$$p-t = \sum_{k=1}^{t} \Delta p_{i,k}^{-} = \sum_{k=1}^{t} \min(\Delta pi,k, 0)$$

+ The long-run coefficients for p+t and pt are calculated as follows: - $\frac{\beta}{\beta}$2$\frac{i}{1i}$

$-\frac{\beta 2i}{\beta 1i}$. and -

The following is the reparameterization of the prior equation for error correction:

$$\Delta r_{it} = \tau_i(r_{i,t-1} - \phi_{0i} - \phi_{2i}^{+} p_{i-1}^{+} - \phi_{2i}^{-} p_{i-1}^{-}) + \sum_{j=1}^{N1} \lambda_{ij} \Delta r_{i,t-j} + \sum_{j=0}^{N2} \gamma_{ij}^{+} \Delta p_{t-j}^{+} + \sum_{j=0}^{N2} \gamma_{ij}^{-} \Delta p_{t-j}^{-} + \mu_i + \varepsilon_{i,t} \quad (8)$$

where τ_iThe error correction speed of adjustment is measured.

5. Empirical model estimation and interpretation

The result of the Hausman test, see Table 1, for the symmetric and asymmetric panel ARDL models. Coefficient of homogeneity in the long run limitations cannot be ruled out at a 5% level of relevance for both versions of the ARDL model, demonstrating the existence of long-run homogeneous correlations across the nations and confirming the choice PMG estimator has an advantage over MG estimator

Table 1: Results of Hausman's standard test.

Long-Run homogeneity limits on coefficients are put to the test.	Symmetric	Asymmetric
Ho: Coefficient differences are not systematic Hausman's figure:χk^2	0.74	2.35
Prob >χk^2	0.3900	0.3081

We utilize the MG and PMG estimators to estimate the symmetric and asymmetric versions On the ARDL model panel; then, we will employ the usual to apply the Hausman test to check the limitation on parameter homogeneity in the long term

Table 2: Present the ARDL model's estimate results from both versions. The table shows the PMG estimation results, which comprise Long-run parameter estimates that have been pooled, and short-run parameter estimates that have been averaged. Part A shows the result of the ARDL symmetric model, whereas section B shows the output of the ARDL model that is asymmetric or nonlinear. Each calculated coefficient is the percentage change index of the stock market caused by a change in the world oil price of one unit.

We estimate the ARDL model with various lag structures to test our regression's resilience findings and analyze the degree of sensitivity of regression results to differences in the lag duration. 1st column shows the output from the ARDL (2, 2, 2); column 2 of the model gives the ARDL (1, 2, 2) regression output, and The ARDL is shown in column 3. (2, 1, 1) estimate, last but not least, column 4 shows the results of the ARDL (1, 1, 1) model 1.

Table 2 shows that regardless of the lag structure's long term, the symmetric and asymmetric coefficients for the changing oil price are statistically significant versions of the ARDL model. Surprisingly, we discover that the stock market index and global oil prices have a positive association, implying that an increase in oil price would result in a stock market explosion. According to the symmetric model, a unit rise in oil price on the worldwide market would be followed by a 1–1.2 percent gain in the stock market index.

In the asymmetric layout, an increase in oil price leads to a 0.5 percent increase in the stock market index, despite a drop in oil prices leading to a 0.3 percent reduction index of the stock market in the long term for all four groups. So, regardless of the prototype version as well as the lag structure, Oil price movements may be both favorable and bad are likely to have a large additionally beneficial influence on the stock market in the long term, while the degree of responsiveness is bigger for positive oil price shocks than for negative oil price shocks. The short-run is positive for all four

groups in the symmetric form ARDL model reaction of the stock market's response to variations in oil price is likewise strong and favorable. Our findings contrast those of Diaz and de Gracia (2017) [17] for G7 nations and Sahu, Bandopadhyay *et al*. (2014) [57] for the Indian stock market, who found that a positive shock oil price had only a short-run substantial beneficial influence on stock returns.

Table 2: Results of Linar ARDL

Variable	ARDL (2,2,2)	ARDL(1,2,2)	ARDL (2,1,1)	ARDL (1,1,1)
p	0.0109***/ (0.0020)	0.0118***/ (0.0028)	0.0103***/(0.0022)	0.0112***/(0.0029)
Δp	0.0007***/(0.0002)	0.0009***/(0.0001)	0.0009***/ (0.0002)	0.0009***/ (0.0001)
Δp_t-1	0.0006***/ (0.0001)	0.0004***/ (0.0001)		
Δr_t-1	0.5008***/(0.0025)		0.4985***/(0.0027)	
constant	−0.0327***/(0.0065)	−0.0333/(0.0075)	−0.0293***/ (0.0071)	−0.0303***/(0.0088)
Convergence Coefficient	0.0119***/(0.0016)	0.0123***/ (0.0019)	0.0106***/ (0.0018)	0.0110***/ (0.0025)
Log likelihood	2286.144	1965.484	2279.574	1959.034
No. of cross sections	4	4	4	4
No. of observations	973	975	973	977

However, in asymmetric models, the index of the stock market responds favorably in response to a drop in oil prices, regardless structure of lag, but in the short term, there seems to be no statistically significant difference meaningful association between bullish oil price shocks and stock prices. As a result, the coefficients' sign and significance for all models are identical, suggesting that our findings are resistant to lag structures with varying lags. Long-term and short-term, there seems to have a significant and beneficial association between the price of oil and the price of stocks. The difference in the stock exchange index reactions to oil price shocks, both positive and negative, implies that Positive oil price shocks do not have the same impact as negative oil price shocks affect negative oil price shocks on the stock market. This adds to the need in the oil-stock nexus; asymmetries must be considered.

In their respective study, Prabheesh, Padhan *et al.* (2020) [50] and Polat (2020) [49] are just a few economists who have written a favorable correlation between stock market performance and oil price. This propensity for equities to move about in lockstep, given the rise in global oil prices completely unanticipated, particularly in oil-importing nations Bangladesh, India, Pakistan, and Sri Lanka, are only a few examples (Kilian and Park 2009, Silvapulle, Smyth *et al*. 2017) [36, 63]. As Bernanke (2016) [13] notes, the price of oil and the stock market responds to a shift in a set of shared fundamental characteristics known as global aggregate demand. On the one hand, lowering the whole demand would decrease oil demand, putting the oil price under downward pressure. A slowdown in aggregate demand, on the other hand, will affect corporate earnings, causing the stock price is expected to drop. As a result, when stock traders react to a shift in the value of oil, they are reacting to a change in a set of shared core causes that have caused the value of oil to transform.

This leads to a reduced stock exchange return (i.e., co-movement in one direction) and a halt in financial activity inside oil-importing countries. Its value noting if the magnitudes of the variables are asymmetric effect shocks in the price of oil is due to the energy products' inelasticity (i.e., necessity good) (Khan, Ghazanfar *et al*. 2020) [34]. However, while the price of oil variations are linked to stock market worries, the multiplier impact of such uncertainty may not be as terrible since the need for oil often does not stretch and is inelastic and fluctuate as much as other elastic items prices.

Table 3: Results of nonlinear estimation

	ARDL (2,2,2)	ARDL(1,2,2)	ARDL (2,1,1)	ARDL (1,1,1)
$p+$	0.0051***/ (0.0008)	0.0051***/(0.0011)	0.0047***/(0.0008)	0.0050***/(0.0011)
$p-$	0.0033***/(0.0009)	0.0033***/(0.0012)	0.0029***/(0.0009)	0.0032***/(0.0012)
$\Delta p+$	0.0004*/(0.0002)	0.0005/(0.0005)	0.0003/(0.0003)	0.0005/(0.0006)
$\Delta p+t-1$	0.0001/(0.0004)	−0.0003/(0.0005)		
$\Delta p-$	0.0007***/(0.0002)	0.0008*/(0.0004)		0.0011***/ (0.0004)
$\Delta p-t-1$	0.0008***/(0.0001)	0.0006***/(0.0002)		
Δr_t-1	0.4947***/(0.0070)		0.0010***/(0.0003)	
constant	−0.1130***/(0.0254)	−0.1189***/(0.0293)	−0.1065***/(0.0278)	−0.1085***/(0.0325)
Convergence Coefficient	0.0370***/(0.0062)	0.0390***/(0.0074)	0.0346***/(0.0070)	0.00350***/ (0.0086)
Log likelihood	2310.23	1981.572	2295.91	1975.173
No. of cross sections	4	4	4	4
No. of observations	971	971	973	975

Note that the symbols ***, **, and * represent significance at the 1%, 5%, and 10% levels of significance, likewise, and that the numbers in parenthesis are standard errors. The 2New–West technique calculates the standard errors in parenthesis, and it is resilient to heteroscedasticity and autocorrelation.

6. Conclusion

Because of their tight association, the stock exchange is sometimes referred to as the gauge of the economy. Increases in energy or oil prices, on the other side, are also financially damaging (2009, Oberndorfer). It is value mentioning that

energy subsidies are ineffective, particularly large in most South Asian countries, since retail fuel and power prices are set lower than market pricing.

According to Energy subsidies, Mujeri *et al*. (2013) in Bangladesh and Pakistan topped 3% of GDP, with electricity and petroleum products accounting for roughly Subsidies amounting to 90%. They may also cause misconceptions that would be detrimental to welfare. As a result, the primary goal of our research is to look at the connection between worldwide oil prices and stock markets in the south of Asia. This study is the first attempt at a bivariate analysis of the relationship between the questions' variables.

We use the MG and PMG estimators for symmetric and asymmetric estimation versions. Both variants of the panel ARDL model and both versions of the model demonstrate a favorable situation link between the stock exchange and the global price of oil, implying that an increase in oil price would result in a stock market explosion. Oil price shocks are thought to lower actual stock returns in a well-functioning stock market (Puah *et al*., 2009).

Consequently, our findings show that the stock markets in South Asia are not efficient. Our results substantially impact financial economics because authorities should take steps to improve the stock market's efficiency, stimulating economic activity in the South Asian area. For example, officials should eliminate legal and regulatory hurdles to stock market growth, expand the nation's infrastructure, and increase restore the capability of the stock market participants' trust in the area.

However, our model has several flaws that should be considered in a future study. One option to broaden the scope of this research is to use a framework with several variables and include a few additional economic data, such as inflation and currency rates. Investigating the impact of oil price shocks on stock prices in certain sectors in the context of mechanical breakdowns that directly impact oil prices is another expansion in work.

Given the continuing epidemic, the possibility of this issue may be how the South Asian financial marketplaces react to COVID-19. The pandemic has already impacted many elements of the economy, including labor markets, global supply networks, consumer spending patterns, and the stock market. The slowing economy and the lower influx of capital mean that developing industries, such as those in South Asia, have fewer resources to deal with the pandemic's negative effects.

As a result, the economies of South Asia are the ones that are most prone to succumb to the most. Latest research has begun to look at this problem: for example, Ali and his colleagues (2020) find that the stock exchanges in the impacted countries have plummeted into oblivion, particularly in the latter stages of the unfolding. If we wish to account for the influence of COVID-19 in our study, this means there may be an opposite. The impact of a sudden increase in the price of oil. A more thorough examination taking into account the oil-stock connection consideration of the COVID-19 smash will be left to future study.

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