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Long Run and Short Run Co-Movement among Oil Prices and Stock Market Liquidity: Evidence from the Emerging Equity Market of Pakistan

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ABSTRACT

Abstract: The objective of this study is to examine the long run and short run relationship between oil prices and stock market liquidity in Pakistan stock exchange.

Design/Methodology/Approach: The sample spans 10 years from 2010 to 2019. We use auto-regressive distributed lag (ARDL) to examine long-term and short-term relationships between oil prices, exchange rate, stock market index, market volatility and inflation and stock market liquidity. We use normality checks, serial correlation tests, heteroscedasticity tests, and CUSM models to assess model stability.

Findings: Result shows that there exist a long-term negative association between exchange rate and inflation, but a positive relationship is revealed between oil prices, stock returns, and market volatility. These conclusions hold for three sectors i.e. automobile, cement and sugar.

Implications/Originality/Value: This study extends the existing debate on the relationship between macroeconomic variables and stock market liquidity to the emerging equity market. For this, it uses three proxies for stock market liquidity: Amihud liquidity, average trading volume, and trading volume average.

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Introduction

The movement of global oil prices has a significant impact on both the real and financial markets. Since Hamilton (1983), a growing body of literature has sought to understand how oil price shocks affect different countries. It includes research on the relationship between oil prices and economic growth (Narayan et al., 2014), inflation (Cognigni & Manera, 2008), interest rate (Akram, 2009), unemployment rate (Herrera et al., 2016), and stock market return (Balcilar et al.,

2015). The capital market is vital for economic prosperity. The more stable the capital market is, the more tempting it is to investors (Narayan et al., 2014). Also, when depositing capital, investors expect that their investment will pay off in the long run. Stock liquidity is the capacity to buy and sell significant volumes of stock without impacting prices or transaction costs (Zheng & Su, 2015). Any country's financial industry is vital to its success, and the stock exchange is a vital part of any financial sector's infrastructure. Stock markets have the potential to significantly boost a country's economic growth. A healthy stock market is essential for economic growth. The growth of Pakistan's stock markets has a significant impact on economic growth. Long-term, a healthy stock market can help boost economic growth.

A stock's liquidity is determined by how often it is traded, how many transactions it creates, and how much each transaction is worth. Liquidity refers to the ease of trading stocks (Amihud et al., 2006). Since the global financial crisis, much research has been done on liquidity in financial markets, particularly its determinants and effects. The aggregate discount factor based on a collection of state variables should contribute to determining stock liquidity (Zheng & Su, 2015). The lack of stock movement and financial reporting is one grounds for trade suspension or termination. Prior to performing technical and fundamental stock analysis, investors should examine the stock's liquidity as one of the most critical criteria (Utami et al., 2017). Price, volume, and trading frequency are all based on the information and conditions available at the moment of the trade, according to the efficient market theory (EMT). Because investors react quickly to new information, they can opt to enter the market and spend their capital, causing stock prices to adjust virtually instantly (Nofsinger, 2001). Others, including Ball and Brown (1968), have argued contrary (1969). Lai and coworkers (2009) discovered that stock prices vary when fresh and beneficial information enters the market. Liquidity is essential in trading. Orders and listings follow liquidity. Liquid markets allow traders to buy and sell large quantities of stock without impacting the price. Market liquidity demonstrates efficiency. Insufficient market liquidity can lead to a financial crisis. Measuring liquidity is critical. In this context, four factors matter: trade time, tightness, depth, and resiliency. Various factors influence Pakistan's financial markets. Monetary policy affects stock market liquidity Policies may influence Pakistani stock exchanges. Microeconomic variables may influence the stock market. Liquidity risk is theoretically determined by an aggregate discount factor based on a set of state variables. Less research has been done on the link between oil prices and stock market liquidity. So our paper fills a gap in the literature. Our premise is that international oil market shocks could be a key state variable, and we empirically show it using the Pakistan stock market as an example.

This paper's goal is to see if oil price movements have a long run and short run relation with stock market liquidity. The impact of macroeconomic variables on Pakistani stock exchange liquidity is studied. This study's sample duration is 10 years, from 2010 to 2019. The ultimate sample size for this study is 53 non-financial enterprises listed on the Pakistan stock exchange from three sectors including, automobiles, sugar, and cement. Stock market liquidity is estimated using three proxies - Amihud liquidity, share traded value and trading volume. We use autoregressive distributed lag (ARDL) to examine long-term and short-term relationships between variables. In order to test the model's stability, we use ARDL, serial correlation, heteroscedasticity, and CUSM models.

This work adds to the literature in several ways. First, existing research focuses on stock market returns due to macroeconomic changes. This study adds to the body of research on macroeconomic variables and stock market liquidity with a particular focus on oil prices (Park & Ratti, 2008; O'Neill et al., 2008; Kilian, 2009; Hassan, 2017). Our contribution to the first sort of literature is to discuss the relationship between oil and the stock market. Recent research focuses on the impact of oil price variations on stock market returns. There is still little agreement on the

precise impacts of oil price movements on stock liquidity. It can be positive (Ono, 2011) or negative (Park & Ratti, 2008; O'Neill et al., 2008). A large body of research has focused on this crucial notion since the 2007 financial crisis (Chordia et al, 2001, 2005; Acharya & Pedersen, 2005; Martinez et al, 2005; Levine & Schmukler, 2006). The importance of stock liquidity is explained as follows. First, we can theoretically go beyond the typical asset pricing approach that assumes constant trade frictions by considering variations in liquidity. After the global financial crisis, individuals realised the need of including liquidity risk. Liquidity risk is a major cause of financial crises, particularly in emerging nations conversely, improved liquidity can greatly contribute to financial and economic growth in underdeveloped countries (Bekaert et al., 2007; Bekaert & Harvey, 2000). Second, it extends the existing debate on macroeconomic variables and stock market liquidity to emerging equity markets (Sklavos, Dam & Scholtens, 2013). Bekaert et al. (2007) suggest that better liquidity circumstances can boost financial and economic growth in emerging markets. To examine the impact of macroeconomic variables on sectoral levels in the equity market. Fourth, it measures stock market liquidity using three separate proxies: Amihud liquidity, average trading, and trading volume. Previous research on market liquidity have employed VAR (Fujimoto, 2004; Chordia, Sarkar, & Subrahmanyam, 2005). We use autoregressive distributed lag (ARDL) to examine long-term and short-term relationships between variables.

The hypothesis development of the study are discussed in the next section, which is followed by the data and research methods. The empirical findings of the study are discussed in the following section, which is followed by the conclusion of the study.

Literature Reviews

Various studies on the stock market have been conducted previously. The Pakistani stock market liquidity and macroeconomic variables were examined (Nishat, Shaheen, & Hijazi, 2004; Ali et al., 2010; Hussain, Rafique, & Nawaz, 2013). These studies showed varying results. Pakistani stock liquidity and macroeconomic metrics are examined. It influenced economic progress in Pakistan and Bangladesh. They noted that both stock markets promote economic growth (Zahid, Khan & Tariq, 2012). It also influences Pakistan's economic growth. Nigerian stock market and economic growth were investigated (Ezeabasili & Alajekwe, 2012). So, stock market liquidity helps economic growth. In addition, market size has little impact on economic growth. Decreased capital costs can also be achieved through improving liquidity, according to Bekaert et al. (2007). The link between oil prices and stock market liquidity is rarely addressed. Sklavos et al. (2013) were the first to investigate the link between market liquidity and oil price (2013). Based on data from 130 US enterprises from 2006-2011, they conclude that higher oil returns tend to diminish traded value and market maker pricing spreads. Essentially, higher oil prices lower trading costs, diminish market depth, and discourage continued transaction. Ratti & Vespignani (2013) examine the relationship between Chinese liquidity and crude oil prices. As a proxy for market liquidity, they argue that China's M2 has a significantly higher impact on the global oil market than real M2 shocks in some advanced economies. We are particularly concerned in how different forms of global oil market shocks will impact the liquidity status of the Chinese stock market.

The impact of domestic and global macroeconomic variables on ASEAN financial markets (Catherine, 2011). Financial markets in these countries are heavily influenced by economic growth, interest and currency rates. Karachi stock exchange liquidity (Kanasro, Junejo & Junejo, 2011). Based on liquidity, turnover ratio, and market size, they found the stock market less liquid from 1985 to 2006. The Karachi stock exchange lacks liquidity and hence fails to attract investors. Macroeconomic indicators and stock market prices correlated in the US, Japan, and China (Bellalah & Masood, 2019). To understand the Pakistani stock market, read Mehwish

(2013). FDI and value-added commerce boost stock market performance. The banking industry grew slowly. Affect macroeconomic and institutional forces. The research used 42 emerging markets (Yartey, 2008). Major stock market factors include law & order, political risk, & bureaucratic quality. Money supply, total traded value, gross capital creation, CPI, and private sector credit had positive significant impacts on the Amman stock exchange (El-Nader & Alraimony, 2012). Nominal GDP and net remittances had negative effects on stock market growth. Recently, market liquidity has gotten a lot of (Amihud et al., 2005). Numerous studies have examined the impact of oil price fluctuations on stock markets in various economies, including the US, UK, and Europe. (Al-hajj et al., 2017) According to Raza et al. (2016), the price of oil has a negative long-term and short-term impact on stock markets (Al-hajj, Mulali, & Solarin, 2017).

Most studies revealed a negative association (Chen, 2009; Filis, 2010; Basher et al., 2012), although some found a positive one (Basher et al., 2012; Abhyankar et al., 2013). In short, exchange rate and stock market liquidity are linked. Inflation causes foreign capital to flow into the domestic market. It should be opposite stock market liquidity. Finance, trade, real output and stock market liquidity are all affected. Wage depreciation would reduce export costs, increase global competitiveness, and boost cash flow (Li, Lu, Ren, & Zhou, 2018). Controlling inflation is a top issue for emerging markets, and measuring economic growth is vital (Omran & Pointonb, 2001). Plusieurs research on inflation and stock market growth have been conducted (Pradhan, Arvin, & Bahmani, 2015). So, as long as inflation rises, common stock prices should rise to compensate investors. This model predicts an inflation-stock price relationship (Omran & Pointonb, 2001). It appears that the Chinese and US stock exchanges are linked via interest rate, industrial output index, and money supply. On the long term, Japan's money supply is positive. On the Japanese stock market, the industrial production index is favourably correlated with long-term interest rates. Stock prices in India, Pakistan, Bangladesh, and Sri Lanka (Muhammad & Rasheed, 2002). India and Pakistan do not have a long-term correlation between stock values and exchange rates. They didn't exist in South Asia. The effect of inflation on the Egyptian stock market was studied. Stock market performance is affected by inflation both long and short term (Omran & Pointonb, 2001). In addition, the relationship between stock market volatility, real macroeconomic volatility and economic activity was examined. Leverage and stock market volatility go hand in hand.

Data and Research Methodology

The study's initial sample includes 443 Pakistani listed enterprises. This study's sample duration is 10 years, from 2010 to 2019. We excluded the financial sector due to its capital structure and profit needs. The sample also excludes companies for whom no data is available. This study's ultimate sample size is 53 listed non-financial textile companies from Pakistan, and sector wise detail has been presented in table 1. The Karachi Stock Exchange is Pakistan's largest and most liquid. World's Best Performing Stock Market, according to Business Week. The KSE has 602 listed companies worth Rs5.22 trillion (PSX, 2016). FDI in KSE peaked in 2007. The sway began in 2007. A rapid rise in the last two decades The KSE was one of the top ten stock exchanges in 2015. 6 Since 2009, the KSE has been ranked third by Bloomberg. The Pakistan stock exchange unified all three in January 2016. On January 26, 2016, PSX had 558 listed companies worth \$95 billion. Now called Pakistan Stock Exchange.

Table 1: Detail of the Sample of Study

Sr. No.	Sector Detail	Listed Companies	Selected Sample	Percentage
1	Automobiles	22	16	73%
2	Sugar	28	21	75%
3	Cement	22	16	73%
4	Total	72	53	

Measurement of Variables

Market liquidity refers to the ability to buy and sell assets at steady prices. (Akhtar, 2018) There are various indicators of stock market liquidity (Bannan, 2017). We use three proxies to assess stock market liquidity. First is the Amihud stock market liquidity (2002), second, proxy is the share traded average and third is the trade volume.

Amihud Liquidity

This statistic is the absolute daily return divided by the daily trading volume (Amihud, 2002)

$$\text{Amihud Liquidity} = P - 1 = \frac{\text{Average of the absolute daily return}}{\text{Avg of the daily dollar trading volume}}$$

Average Value of Share Traded

The second indicator of stock market liquidity is average value of the share traded. It is the daily average share traded times the market price.

$$P - 2 = \text{Average value of share trading in a day} \times \text{Market Price of Share}$$

Trading Volume

Trading volume is the third proxy for stock market liquidity. Trading volume counts shares. Larger trading volume equities are more liquid (Bogdan et al, 2012; Baruch & Saar, 2009).

$$\text{Trading Volume} = P - 3 = \text{Average number of share trading in given day}$$

Table 2: Measurement of Variables

Sr. No.	Variable Name	Measurement	References	Data Sources
1	Oil Prices	Europe Brent Spot Price (Dollars/Barrel)	(Husnain & Akhtar, 2016)	US energy information administration
2	Exchange Rate	Pakistani Rupee Per USD	(Husnain & Akhtar, 2016)	
3	Stock Market Index	KSE-100 Index	(Sarwar et al., 2018)	Bloomberg
4	Market Volatility	Standard deviation of stock market return	(Matar et al., 2013)	
5	Inflation	Changes in consumer price index	(Stanford, 2008)	

Research Methodology

This study examines the impact of oil prices, exchange rates, stock market returns, volatility, and inflation on stock market liquidity by using three proxy measures of stock market liquidity, and we developed the following equations.

$$\text{LIQ} = \alpha + \rho \text{LIQ}_{t-i} + \beta_1 \text{OP}_{t-i} + \beta_2 \text{ER}_{t-i} + \beta_3 \text{Mkt Rtn}_{t-i} + \beta_4 \text{VTL}_{t-i} + \beta_5 \text{CPI}_{t-i} + \varepsilon_{t-i} \dots \dots (1)$$

In this example, LIQ stands for stock market liquidity, OP represents oil prices, ER stands for exchange rate, Mkt Rtn stands for market return, VTL is for market volatility, and CPI stands for consumer price index.

First, the stationarity of variables is evaluated using the ADF and PP tests. If all variables are stationary at I (0), I (1), or I (2), we can use the ARDL technique. Following the ARDL, we perform diagnostic tests such as normality, serial correlation, and heteroscedasticity. For our estimated models, we use CUSM and CUSM square graphs to test model stability. The bound test between variables shows the long run relationship. The long run and short impact of oil prices, exchange rate, market return, market volatility and inflation on stock market liquidity is estimated through the following equations.

$$LIQ - P1 = \alpha + \rho LIQ_{t-i} + \beta_1 OP_{t-i} + \beta_2 ER_{t-i} + \beta_3 KSE100 \text{ index}_{t-i} + \beta_4 VTI_{t-i} + \beta_5 CPI_{t-i} + \varepsilon_{t-i} \dots \dots (2)$$

$$LIQ - P2 = \alpha + \rho LIQ_{t-i} + \beta_1 OP_{t-i} + \beta_2 ER_{t-i} + \beta_3 KSE100 \text{ index}_{t-i} + \beta_4 VTI_{t-i} + \beta_5 CPI_{t-i} + \varepsilon_{t-i} \dots \dots (3)$$

$$LIQ - P3 = \alpha + \rho LIQ_{t-i} + \beta_1 OP_{t-i} + \beta_2 ER_{t-i} + \beta_3 KSE100 \text{ index}_{t-i} + \beta_4 VTI_{t-i} + \beta_5 CPI_{t-i} + \varepsilon_{t-i} \dots \dots (4)$$

To capture the short run association among the variables, we estimated the following equations;

$$\Delta LIQ - P1 = \alpha + \Delta \rho LIQ_{t-i} + \Delta \beta_1 OP_{t-i} + \Delta \beta_2 ER_{t-i} + \Delta \beta_3 \text{Mkt Rtn}_{t-i} + \Delta \beta_4 VTI_{t-i} + \Delta \beta_5 CPI_{t-i} + ecm + \varepsilon_{t-i} \dots \dots (5)$$

$$\Delta LIQ - P2 = \alpha + \Delta \rho LIQ_{t-i} + \Delta \beta_1 OP_{t-i} + \Delta \beta_2 ER_{t-i} + \Delta \beta_3 \text{Mkt Rtn}_{t-i} + \Delta \beta_4 VTI_{t-i} + \Delta \beta_5 CPI_{t-i} + ecm + \varepsilon_{t-i} \dots \dots (6)$$

$$\Delta LIQ - P3 = \alpha + \Delta \rho LIQ_{t-i} + \Delta \beta_1 OP_{t-i} + \Delta \beta_2 ER_{t-i} + \Delta \beta_3 \text{Mkt Rtn}_{t-i} + \Delta \beta_4 VTI_{t-i} + \Delta \beta_5 CPI_{t-i} + ecm + \varepsilon_{t-i} \dots \dots (7)$$

Empirical Results

ADF and Phillips-Perron tests were used to determine the stationarity of time series data (table 3). The results reveal that all three proxies of stock market liquidity for selected three sectors are stationary at level, i.e. I(0). Furthermore, the oil prices are stationary at their first difference, I(1), as is the CPI. Exchange rate, stock market return, and volatility are stationary at level. These findings coincide with the PP test.

Table 3: Unit Root Test

Variables		ADF test		PP test	
		Level	1 st Diff	Level	1 st Diff
Automobiles	LIQ - P1	-3.65***	-11.7***	-5.13***	-13.4***
	LIQ - P2	-3.78***	-14.9***	-4.66***	-15.1***
	LIQ - P3	-3.38***	-12.0***	-3.17***	-14.0***
Sugar	LIQ - P1	-3.06***	-11.9***	-5.75***	-11.0***
	LIQ - P2	-4.39***	-11.1***	-3.57***	-11.4***
	LIQ - P3	-3.72***	-14.6***	-5.30***	-11.3***
Cement	LIQ - P1	-4.93***	-13.3***	-5.78***	-15.8***
	LIQ - P2	-5.49***	-13.2***	-3.08***	-13.3***
	LIQ - P3	-5.09***	-12.6***	-3.27***	-15.4***
Oil Prices		-1.13	-9.26***	-1.41	-10.58***
Exchange Rate		2.48**	-5.01***	1.99*	-10.23***
KSE 100 Index		-2.14*	-10.59***	-2.41*	-13.50***
Stock Market Volatility		-9.05***	-11.58***	-9.01***	-46.23***
CPI		0.128	-2.01**	1.99*	-5.83***

Note: *, **, *** shows significance at level 10%, 5% and 1%, respectively.

After the unit root analysis, next we perform the bound test. The bound test compares F-statistics to upper and lower critical values. The null hypothesis for this test is "no long term connection." No long term correlation if F statistic is below lower bound. An upper bound value indicates a long-term relationship. F-statistics 0-1 are regarded inconclusive. This study measures stock market liquidity using three proxies: P1, P2 and P3. When the F-statistic is larger than the upper bound, the bound test indicates a long-term connection. The F value for automobile, sugar and cement are 8.10, 11.52 and 12.01 respectively. The value of F-stats is clearly bigger than the bottom and upper bounds. Thus, the bound test null hypothesis is rejected. Thus, there is a long run relationship between variables in three sectors and three proxies of stock market liquidity.

Long Run and Short Run Coefficient of ARDL

Co-integration test used to find long-term relationships. This study used the ARDL model

(equations 2, 3, and 4) to estimate the long run coefficient among variables for each proxy of three selected sectors in Pakistan stock market. Table 4 shows the outcomes. The results show that historical stock market liquidity patterns have a major impact on future liquidity. Exchange rate and inflation are long-term negative whereas oil prices, stock return, and market volatility are long-term positive relation with stock market liquidity. These findings hold for three separate proxies of stock market liquidity in Pakistan: automobile, cement and sugar.

Table 4: Long Run Coefficient of ARDL Model in Selected Sectors

Variables	LIQ - P1 Coefficient	LIQ - P2 Coefficient	LIQ - P3 Coefficient
Panel A: Automobile			
LIQ (-1)	0.487*	0.019*	0.797**
In_ OP	0.577***	0.667***	0.134**
In_ ER	-0.030**	-0.505*	-0.974**
In_ KSE 100	0.981	-0.642	-0.118
In_ VTL	0.020*	0.746**	0.327**
In_ CPI	-0.707**	-0.376**	-0.495**
Panel B: Cement			
LIQ (-1)	0.840	0.088*	0.026**
In_ OP	0.211***	0.643***	0.451**
In_ ER	-0.592*	-0.743**	-0.935***
In_ KSE 100	0.211**	0.349**	0.328*
In_ VTL	0.634*	0.497***	0.661
In_ CPI	-0.087**	0.426	-0.563**
Panel C: Sugar			
LIQ (-1)	0.575	0.969**	0.124
In_ OP	0.791***	0.981***	0.348***
In_ ER	-0.868*	-0.695**	-0.275
In_ KSE 100	0.287	0.631***	0.648**
In_ VTL	0.211***	0.359***	0.321
In_ CPI	-0.690***	-0.367***	-0.255**
We estimate the above long run ARDL estimates for textile composite with following equations:			
$LIQ - P1 = \alpha + \rho LIQ_{t-i} + \beta_1 OP_{t-i} + \beta_2 ER_{t-i} + \beta_3 KSE100_{t-i} + \beta_4 VTL_{t-i} + \beta_5 CPI_{t-i} + \varepsilon_{t-i}$			
$LIQ - P2 = \alpha + \rho LIQ_{t-i} + \beta_1 OP_{t-i} + \beta_2 ER_{t-i} + \beta_3 KSE100_{t-i} + \beta_4 VTL_{t-i} + \beta_5 CPI_{t-i} + \varepsilon_{t-i}$			
$LIQ - P3 = \alpha + \rho LIQ_{t-i} + \beta_1 OP_{t-i} + \beta_2 ER_{t-i} + \beta_3 KSE100_{t-i} + \beta_4 VTL_{t-i} + \beta_5 CPI_{t-i} + \varepsilon_{t-i}$			

Dependent Variable is the Stock Market Liquidity

*, **, *** shows significance at level 10%, 5% and 1%, respectively

The co-integration test is also used to find short-run relationships. This study used the ARDL model (equations 5,6, and 7) to determine the short run coefficient between variables for three sectors of the Pakistan stock exchange. Table 5 shows the outcomes. An adjustment from disequilibrium to equilibrium in a short time is also analyzed. Short run model has two pieces. A measure of error correction speed is dependent on the short run dynamics coefficient. It shows how quickly disequilibrium becomes equilibrium. The results show that historical stock market liquidity patterns have a major impact on future liquidity. Exchange rate and inflation are short term negative whereas oil prices, stock return, and market volatility are short term positive co-movement with stock market liquidity. These findings hold for three separate proxies of stock market liquidity in Pakistan: automobile, cement and sugar. Also, F-Stat is significant for all estimated models, indicating that they are statistically stable and fit.

Table 5: Short Run Coefficient of ARDL Model in Selected Sectors

Variables	LIQ - P1	LIQ - P2	LIQ - P3
Panel A: Automobile			
$\Delta \ln LIQ (-1)$	0.406*	0.978**	0.684
$\Delta \ln OP$	0.367***	0.295***	0.599**

$\Delta \ln_OP (-1)$	0.712**	0.186**	0.945**
$\Delta \ln_ER$	-0.159**	-0.658**	-0.642***
$\Delta \ln_KSE\ 100$	0.857**	0.238***	0.274***
$\Delta \ln_KSE\ 100 (-1)$	0.230***	0.833	0.269
$\Delta \ln_VTL$	0.720**	0.489***	0.115**
$\Delta \ln_CPI$	0.850	-0.861**	-0.256***
$Ecm (-1)$	-0.062***	-0.850**	-0.550**
F – Statistics (Sig.)	0.021	0.011	0.000
Panel B: Cement			
$\Delta \ln_LIQ (-1)$	0.671	0.524**	0.937*
$\Delta \ln_OP$	0.604***	0.433***	0.824***
$\Delta \ln_OP (-1)$	0.888***	0.611***	0.905***
$\Delta \ln_ER$	-0.040***	-0.246	-0.176***
$\Delta \ln_KSE\ 100$	0.809**	0.693***	0.141***
$\Delta \ln_KSE\ 100 (-1)$	0.806***	0.023***	0.683***
$\Delta \ln_VTL$	0.281**	0.419**	0.561**
$\Delta \ln_CPI$	-0.053***	-0.946**	-0.672
$Ecm (-1)$	-0.324**	-0.539**	-0.044***
F – Statistics (Sig)	0.031	0.000	0.003
Panel C: Sugar			
$\Delta \ln_LIQ (-1)$	0.329*	0.669**	0.888**
$\Delta \ln_OP$	0.679**	0.275***	0.198*
$\Delta \ln_OP (-1)$	0.406**	0.091***	0.492**
$\Delta \ln_ER$	-0.595***	-0.408**	-0.546**
$\Delta \ln_KSE\ 100$	0.497	0.243***	0.805***
$\Delta \ln_KSE\ 100 (-1)$	0.189***	0.336**	0.385*
$\Delta \ln_VTL$	0.625**	0.528**	0.980***
$\Delta \ln_CPI$	-0.367	-0.946***	-0.846***
$Ecm (-1)$	-0.361***	-0.851*	-0.467*
F – Statistics	0.021	0.043	0.021

Estimating Short Run ARDL Equation for Textile sector:
 $\Delta LIQ - P1 = \alpha + \Delta\beta_1 OP_{t-i} + \Delta\beta_2 ER_{t-i} + \Delta\beta_3 KSE100_{t-i} + \Delta\beta_4 OPRD_{t-i} + \Delta\beta_5 CPI_{t-i} + VTL_{t-i} + CPI_{t-i} + ecm + \varepsilon_{t-i}$
 $\Delta LIQ - P2 = \alpha + \Delta\beta_1 OP_{t-i} + \Delta\beta_2 ER_{t-i} + \Delta\beta_3 KSE100_{t-i} + \Delta\beta_4 OPRD_{t-i} + \Delta\beta_5 CPI_{t-i} + VTL_{t-i} + CPI_{t-i} + ecm + \varepsilon_{t-i}$
 $\Delta LIQ - P3 = \alpha + \Delta\beta_1 OP_{t-i} + \Delta\beta_2 ER_{t-i} + \Delta\beta_3 KSE100_{t-i} + \Delta\beta_4 OPRD_{t-i} + \Delta\beta_5 CPI_{t-i} + VTL_{t-i} + CPI_{t-i} + ecm + \varepsilon_{t-i}$

*, **, *** shows significance at level 10%, 5% and 1%, respectively

Diagnostic Test

In the Breusch–Godfrey serial correlation test, the LM test determines whether or not a regression model's errors are autocorrelated. To finish the calculation, it uses the residuals from the regression model. The null hypothesis is that the two variables are not serially correlated. The null hypothesis of heteroscedasticity states that the data are homoscedastic. Moreover, despite its low P-value, the null hypothesis cannot be rejected because the model's residuals remain constant throughout time. So, the model is statistically stable and well-fit. Stability tests show how well a model holds up over time (Bahmani-Oskooee, 2001). The stability of the regression coefficient is determined using CUSUM statistics against Brown et al (1975). The null hypothesis (all coefficients in the ECM model are stable) cannot be rejected if the statistical curve is within 5% significance level. These figures show that the stability plot stayed within crucial bounds. Thus, the econometric model is stable.

Table 6: Diagnostic Test

Sectors	Variables	Serial Correlation	Heteroscedasticity
Automobiles	Txt P1	0.304	0.495
	LIQ - P1	0.394	0.062
	LIQ - P2	0.719	0.363
	LIQ - P3	0.540	0.721

Sugar	LIQ - P1	0.544	0.931
	LIQ - P2	0.539	0.757
	LIQ - P3	0.252	0.102
Cement	LIQ - P1	0.349	0.942
	LIQ - P2	0.138	0.131

Figure: Plot of the CUSUM for Automobile Sector

Figure: Plot of the CUSUM for Cement Sector

Figure: Plot of the CUSUM for Sugar Sector

Conclusion

Liquidity refers to the volume of trading securities on the stock market as opposed to the price of the securities being traded. At the same time, oil is viewed as a critical component of the economic infrastructure. A non-diversifiable risk factor could arise if the oil price and market liquidity are connected. Stock investors will hence expect a systematic liquidity premium. Theoretical and empirical research on this problem has proven in recent years. The stock market is a great area to invest in large and small projects. The long run and short run association of oil prices with Pakistani stock exchange liquidity is studied. This study's sample duration is 10 years, from 2010 to 2019. The ultimate sample size for this study is 53 non-financial enterprises listed

on the Pakistan Stock Exchange. Stock market liquidity is estimated using three proxies — Amihud liquidity, share traded value and trading volume. We use auto-regressive distributed lag (ARDL) to examine long-term and short-term relationships between variables. In order to test the model's stability, we use ARDL, serial correlation, heteroscedasticity, and CUSM models.

Overall, the results show that all three stock market liquidity proxies tested are stationary at the same level (0). Also, the oil price is stationary at first difference i.e. I (1), while the CPI is stationary at I (1). (1). Exchange rate, stock market return, and volatility are stationary at level. The PP test results match this study's conclusions. The value of F-stats shows that this number is greater than the distribution's bottom and top bounds. As a result, the data show that the bound test null hypothesis is rejected. A long-term link exists between variables in three industries that are quantified using three different stock market liquidity proxies. The findings show that past stock market liquidity patterns have a significant impact on future liquidity. Oil prices, stock returns, and stock market volatility have a long-term positive association with stock market liquidity. On the Pakistan stock exchange, these findings are robust under three different proxies of stock market liquidity. Also, these findings hold true in the short term. The numerous diagnostic tests, including normality check, serial correlation test, heteroscedasticity test, and CUSM models, revealed that the econometric model is stable. In practice, central banks and regulators are concerned about rapid changes in oil prices and macroeconomic situations. Our findings suggest that central banks and regulators should be able to pinpoint the role of oil price before designing stabilisation policies to increase liquidity and attract investors.

This study has some limitations, e.g. data is not fully available and contains several discrepancies. Only a few papers have been written on time-series liquidity variations, and none link stock and bond markets. Also, future researcher should focus on the theoretical linkages between monetary policy, money flows, stocks, and bonds. Liquidity and risk are valued in the market, but little is known about how market design effects this price (risk). When deciding on a portfolio, how much do liquidity and execution risk weigh? This is an exciting and challenging future research direction.

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