Contents lists available at Science-Gate

International Journal of Advanced and Applied Sciences

Journal homepage: http://www.science-gate.com/IJAAS.html

Is there a "flight to liquidity" phenomenon in the Saudi stock market?

Héla Bensoltane [1, 2, *]

[1]Department of Economics and Finance, College of Business Administration, University of Ha'il, Ha'il, Saudi Arabia
[2]Univ. Manouba, ESCT, LARIMRAF LR21ES29, Campus Universitaire Manouba, 2010, Tunisia

ARTICLE INFO

Article history:
Received 15 December 2023
Received in revised form
22 March 2024
Accepted 26 March 2024

Keywords:
Market illiquidity shocks
Stock prices
Flight to liquidity
Saudi stock market
Firm size impact

ABSTRACT

The study examines how market illiquidity shocks affect stock prices and explores the "flight to liquidity" phenomenon in the largest stock market in the Middle East, specifically the Saudi stock market. It analyzes the relationship between these shocks and stock prices to understand the impact on both small and large firms. Utilizing a comprehensive database that contains daily data of all stocks listed on the Saudi stock market for over 20 years, the research evaluates the illiquidity of each stock and the entire market on a weekly basis. Market illiquidity shocks are determined using an autoregressive model, and the effect of these shocks on Saudi stock prices is assessed through illiquidity betas in linear regressions for both large and small firms. Initial findings show that illiquidity shocks were significant during periods of oil price declines and global financial crises. The results confirm that stock prices fall in response to market illiquidity shocks, with the impact varying by firm size; larger firms' stocks are less affected, indicating a flight to liquidity towards larger firms during market downturns. This pattern aligns with observations in the US and some emerging markets.

1. Introduction

Amihud (2002, 2019) proved that shocks of market illiquidity immediately reduce stock prices on the New York Stock Exchange (NYSE) and on the American Stock Exchange (AMEX). This is explained by the fact that high market illiquidity leads investors to increase their expected stock illiquidity and, thus, their expected stock returns, which reduces contemporaneous stock prices (Amihud, 2002). These findings were validated by many studies on U.S. markets as well as on developed and some emerging markets (Pástor and Stambaugh, 2003; Acharya and Pedersen, 2005; Bekaert et al., 2007; Watanabe and Watanabe, 2008; Lee, 2011; Acharya et al., 2013; Amihud and Noh, 2021; Ben Soltane and Naoui, 2021; Bensoltane, 2023). These studies use the illiquidity beta, introduced by Pástor and Stambaugh (2003), as a measure of the systematic illiquidity risk, which is captured by the sensitivity of asset returns to market illiquidity shocks (innovations in market illiquidity). They compare the illiquidity beta of large firms' stocks to that of small firms' stocks. Findings imply that stocks of small firms are more sensitive to market illiquidity shocks (riskier) than stocks of large firms (Amihud, 2002; Acharya and Pedersen, 2005; Watanabe and Watanabe, 2008; Acharya et al., 2013; Amihud, 2019). This result means the presence of the "flight to liquidity" phenomenon on the market. The "Flight to liquidity" phenomenon is due to the fact that small firms' stocks are supposed to be less liquid than large firms' stocks, leading investors to increase their demand for large firms' stocks (liquid stocks) in times of dire illiquidity, which in turn weakens the negative effect of market illiquidity shocks on stock returns of large firms and lowers their illiquidity beta (Amihud, 2002; 2019).

In this study, shocks of market illiquidity are estimated on the Saudi stock exchange over a period of more than twenty years in order to quantify the sensitivities of stock prices to market illiquidity shocks and to examine the investor behavior of "flight to liquidity" on the largest stock market in the Middle East. To achieve this purpose, I selected all stocks that had been continuously listed on the Saudi stock exchange for twenty and a half years. I use daily data to measure the illiquidity degree of each stock as well as the illiquidity of the whole market and then the shocks of market illiquidity that occurred in this period. Estimation results show that market illiquidity shocks significantly lower all stock

* Corresponding Author.
Email Address: he.ghazali@uoh.edu.sa
https://doi.org/10.21833/ijaas.2024.04.006
Corresponding author's ORCID profile:
https://orcid.org/0000-0002-0615-4807

prices on the Saudi stock market, and this negative effect depends on the firm size. Moreover, findings validate the presence of episodes of "flight to liquidity" in the Saudi stock market.

This paper proceeds as follows. Section 2 describes the methodology. Results are discussed in section 3. Section 4 summarizes and concludes the study.

2. Methodology

The empirical study is based on a rich dataset which includes daily data of all stocks that are continuously listed in the Saudi Stock Exchange during a period of twenty and a half years (from 2001, December 31 to 2021, June 21). 2,186,980 daily market data consist of trading volumes and prices of the 214 quoted stocks in addition to the index price of the Saudi stock market (TASI, Tadawul All Share Index). Data also includes the daily Saudi Arabian Interbank Offered Rate (SAIBOR), which serves as a proxy for risk-free rate returns.

For each stock, I measure the individual illiquidity level each week using the Amihud's (2002) ratio as follows:

$$illiq_{i,t} = \frac{1}{T_{i,t}} \times \sum_{d=1}^{T} \frac{|R_{i,d,t}|}{Vol_{i,d,t}} \quad (1)$$

where, $illiq_{i,t}$ is the illiquidity level of stock i during the week t, $T_{i,t}$ is the number of daily stock observations during the week t, $Vol_{i,d,t}$ is the daily trading volume (measured in million Saudi Riyal) of stock i during the week t, and $|R_{i,d,t}|$ is the absolute value of the daily stock return, which is computed using daily stock prices $P_{i,d,t}$ and $P_{i,d-1,t}$ by $(100 \times \frac{P_{i,d,t}-P_{i,d-1,t}}{P_{i,d-1,t}})$.

No measure can capture all dimensions of market illiquidity. However, the Amihud's (2002) measure is the most commonly used proxy of stock illiquidity in the finance literature (Kim and Kim, 2023; Lin et al., 2023; Barardehi et al., 2021). Its popularity is due to its simple construction that employs the absolute daily return-to-volume ratio and to its strong relation with the expected stock return, as proved in several analyses (Amihud, 2002; Acharya and Pedersen, 2005; Acharya et al., 2013; Amihud, 2019). By providing the absolute percentage change of the stock price accompanying the traded volume, the Amihud's (2002) ratio measures the price impact of the trading volume. The larger the price impact, the more illiquid the stock.

Stocks that frequently have null market data (zero trading volumes and zero returns during 3 consecutive weeks or more) are removed from the sample in order to avoid erratic values of $illiq_{i,t}$. The illiquidity degree of the whole Saudi market is computed weekly by the equally weighted average of the illiquidity levels of all stocks included in the final sample, using the following equation as in Amihud (2002), Acharya and Pedersen (2005), Watanabe and Watanabe (2008), Lee (2011), Acharya et al. (2013), and Ben Soltane and Naoui (2021).

$$Milliq_t = \frac{1}{N_t} \sum_{i=1}^{N_t} illiq_{i,t} \quad (2)$$

where, $Milliq_t$ is the market illiquidity level at week t and N_t is the number of quoted stocks on the Saudi stock exchange at week t. According to the methodology of Amihud (2002, 2019), market illiquidity is often persistent and can be predicted using an autoregressive model. This is based on the hypothesis that investors can predict the market illiquidity level at week t based on the market illiquidity level observed on week t-1. This is in order to set their prices, which generate the required return in week t. Hence, the next regression;

$$Milliq_t = a_0 + \sum_{i=1}^{n} a_i \times Milliq_{t-1} + \varepsilon_t \quad (3)$$

where, a_0 and a_i are the coefficients of the autoregressive model, n is the number of lags that should be selected so that the residuals will be serially uncorrelated, and ε_t is the model residual. Unpredictable levels of market illiquidity are interpreted as illiquidity shocks and are measured by the residuals extracted from the autoregressive model that predicts the market illiquidity in Eq. 3, as in Amihud (2002, 2019). Illiquidity shocks at week t are designated by $Silliq_t$ and are determined as follows, where $\hat{\varepsilon}_t$ are the residuals extracted from Eq. 3.

$$Silliq_t = \hat{\varepsilon}_t. \quad (4)$$

The next objective of this study is to explore the relationship over time between estimated illiquidity shocks and stock returns. In other words, the next objective consists of measuring the systematic illiquidity risk of stocks. To do that, I compute the weekly return for each stock using the following equation, where $P_{i,d-4,t}$ is the price of stock i at day $d-4$ of week t.

$$R_{i,t} = 100 \times \frac{P_{i,d,t}-P_{i,d-4,t}}{P_{i,d-4,t}}. \quad (5)$$

I sort stocks into two-sized portfolios, i.e., the smallest and the largest portfolio. This allows us to compare the illiquidity risks of both portfolios and verify whether the stocks of the largest firms are more (or less) sensitive to illiquidity shocks than those of the smallest firms. For that, I use the classification of the Saudi General Authority of Small and Medium Enterprises, which classifies firms according to their sizes. The smallest portfolio includes stocks of small and medium enterprises that are continuously quoted on the Saudi stock exchange, and the largest portfolio includes stocks of large enterprises continuously listed on the Saudi market. I evaluate the weekly illiquidity degree of each portfolio similarly to the illiquidity level of the market portfolio expressed in Eq. 2. The illiquidity level of the sized portfolio is determined by the average of the weekly illiquidity levels of stocks included in the portfolio at week t, as follows:

$$illiq_{L,t} = \frac{1}{N_{L,t}} \sum_{i=1}^{N_{L,t}} illiq_{i,t} \quad (6)$$

$$illiq_{S,t} = \frac{1}{N_{S,t}} \sum_{i=1}^{N_{S,t}} illiq_{i,t} \quad (7)$$

where, $illiq_{L,t}$ and $illiq_{S,t}$ are the illiquidity level at week t of the largest portfolio and of the smallest portfolio, respectively.

Moreover, the weekly returns of each portfolio are computed by the following equations, where $R_{L,t}$ and $R_{S,t}$ are the returns of the largest portfolio and the smallest portfolio, respectively, at week t, $N_{L,t}$ and $N_{S,t}$ are the number of stocks included in each portfolio at week t.

$$R_{L,t} = \frac{1}{N_{L,t}} \sum_{i=1}^{N_{L,t}} R_{i,t} \quad (8)$$

$$R_{S,t} = \frac{1}{N_{S,t}} \sum_{i=1}^{N_{S,t}} R_{i,t}. \quad (9)$$

After estimating and measuring all aspects of the relationship between illiquidity and returns, it is possible to assess how portfolio returns respond to shocks in market illiquidity. To accomplish this, I apply the model developed by Watanabe and Watanabe (2008), which involves regressing excess returns against market illiquidity shocks. This is done separately for the largest and smallest portfolios to succinctly determine the impact of market illiquidity shocks on returns:

$$R_{L,t} - Rf_t = \alpha_t^L + (\beta_{silliq}^L \times Silliq_t) + u_t^L \quad (10)$$

$$R_{S,t} - Rf_t = \alpha_t^S + (\beta_{silliq}^S \times Silliq_t) + u_t^S. \quad (11)$$

$R_{L,t} - Rf_t$ and $R_{S,t} - Rf_t$ are the portfolio excess returns of the largest portfolio and the smallest portfolio, respectively, at week t, Rf_t is the weekly risk-free return, β_{silliq}^L and β_{silliq}^S are the illiquidity betas of both portfolios measuring the portfolios' return sensitivities to illiquidity shocks, α_t and u_t are respectively the intercept and the residual in each regression. To detect the "flight to liquidity" episodes on the Saudi stock exchange, I compare the estimated illiquidity betas of both portfolios, as in the previous literature. Indeed, previous studies suggested the presence of "flight to liquidity" on stock markets when the illiquidity beta of small firms' portfolios is greater than that of large firms' portfolios (Watanabe and Watanabe, 2008; Acharya et al., 2013; Acharya and Pedersen, 2005; Amihud, 2019). This is explained by the switch made by investors from illiquid to liquid stocks in times of dire illiquidity, leading the price of liquid stock (large firms' stocks) to increase and thus to the reduction of the negative effect of the illiquidity shocks on their prices, lowering the illiquidity beta of large stocks (Amihud, 2002, 2019). The next section presents the results of this study and discusses them.

3. Results and discussions

The weekly returns of the two sized portfolios, which are computed using Eqs. 8 and 9 over the period from 2001, January 31st to 2021, June 30th, are plotted in Fig. 1. From Fig. 1, returns of the smallest portfolio seem more volatile, reaching higher levels than those of the largest portfolio. This is also shown by the descriptive statistics of returns time series that are summarized in Table 1. Table 1 shows higher values of mean and standard deviation of portfolio returns for the smallest portfolio. The weekly mean return and the standard deviation are respectively 0.52 and 6.14 for the smallest portfolio, while for the largest portfolio, the weekly mean return and the standard deviation are respectively 0.28 and 3.66. Returns distributions of both portfolios are left skewed, particularly the distribution of the largest portfolio returns. High values of kurtosis show that both distributions have frequent outliers.

Moreover, results of the Augmented Dickey-Fuller (ADF) test prove that the distributions are stationary over time (ADF statistics for the smallest portfolio and the largest portfolio are respectively -29.1 and -15.7 with a probability equal to 0.000 for both portfolios).

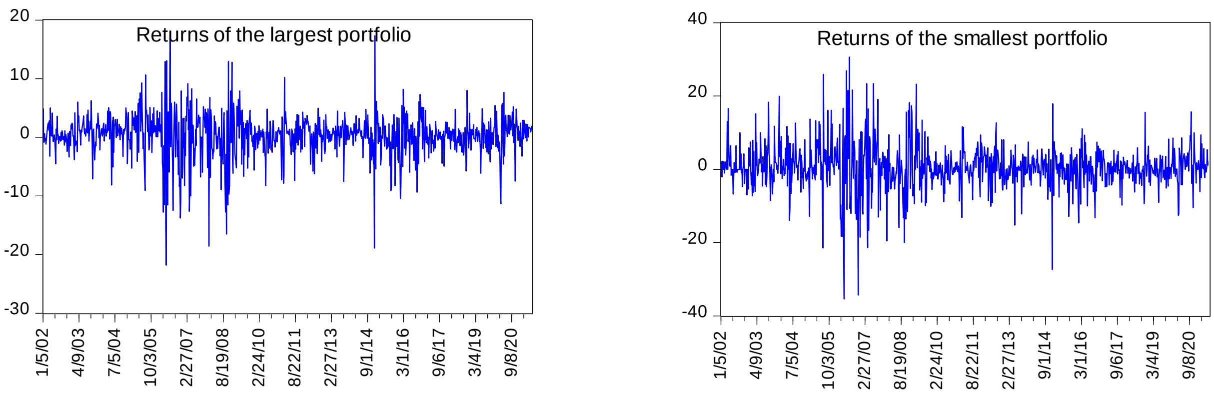

Fig. 1: Weekly returns of stock portfolios on the Saudi stock exchange from 31-01-2001 to 30-06-2021

Table 1: Summary of the descriptive statistics of the weekly returns of the two portfolios

	Mean	Median	Max.	Min.	Std. dev	Skew.	Kurtosis
Largest portfolio	0.284	0.582	17.309	-21.83	3.658	-0.887	8.267
Smallest portfolio	0.524	0.426	30.609	-35.386	6.138	-0.165	8.022

Both portfolios are also characterized by the weekly illiquidity levels that are evaluated by Eqs. 6 and 7 and are plotted in Fig. 2. As shown in Fig. 2, the illiquidity levels of both portfolios move in the same direction and at the same time. However, the illiquidity of the smallest portfolio often achieves higher levels. Table 2, which reports the descriptive statistics of the time series of illiquidity of both portfolios, confirms these findings.

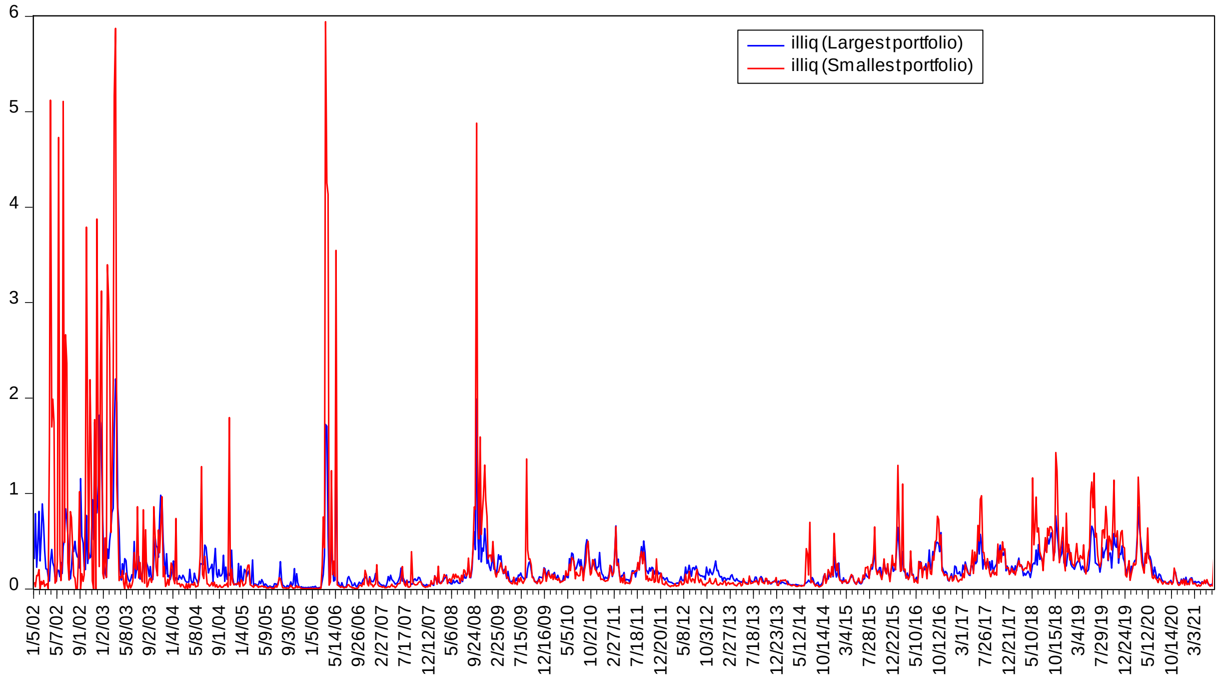

Fig. 2: Evolution of the weekly illiquidity levels of the stock portfolios

Table 2 indicates that the illiquidity levels of both portfolios are, on average, close during the twenty and a half years. However, the smallest portfolio reaches higher illiquidity levels to meet the maximum of 6, whereas the highest illiquidity degree of the largest portfolio is only up to 2.2. This also explains the higher volatility of the illiquidity degree of the smallest portfolio, expressed by the deviation of illiquidity levels from the average. It is also confirmed by the higher kurtosis of the distribution of illiquidity, revealing the existence of many extreme illiquidity levels for the smallest portfolio.

Table 2: Summary of the descriptive statistics of the weekly illiquidity levels of the two portfolios

	Mean	Median	Max.	Min.	Std. dev	Skew.	Kurtosis
Largest portfolio	0.213	0.148	2.200	0.010	0.236	4.092	26.767
Smallest portfolio	0.277	0.109	5.941	0.000	0.606	5.781	42.617

Furthermore, by focusing on the whole market, examination of the time series of $Milliq_t$ reveals that the market illiquidity of the Saudi stock exchange is highly persistent over time. The autocorrelation coefficient of $Milliq_t$ equals 0.70 at a weekly frequency. This implies that market illiquidity in the current week is explained by 70% of observed market illiquidity in the previous week. To extract innovations (shocks of market illiquidity), I specify the autoregressive model that predicts market illiquidity as described in the methodology section. The stationarity of $Milliq_t$ is verified using the ADF test (ADF statistic=-11,06; probability p=0,000). I choose the number of lags that ensures the absence or the quasi-absence of autocorrelation in residuals of the autoregressive model. To do that, I use three criteria that could detect autocorrelation in residuals, i.e., the correlation coefficient of residuals from the correlogram, the Durbin Watson (DW) test, which indicates the absence of autocorrelation in residuals when the DW statistic equals 2, and the Akaike information criterion (AIC) that indicates the best fit of the autoregressive model when its value is the lowest. I compare values of criteria for each lagged series of market illiquidity, as shown in Table 3.

Table 3: Criteria values of choice of the autoregressive model that predicts market illiquidity

	Lag=1	Lag=2	Lag=3	Lag=4
Coef. of autocorrelation	-0.084	ρ= -0.001	ρ= -0.001	ρ= -0.005
Durbin Watson statistic	2,160	1,997	2,001	2.005
AIC	-0.615	-0.633	-0.636	-0.637

Results in Table 3 lead to the selection of an amount of lag equal to 3 for the autoregressive model predicting Saudi market illiquidity. This is justified by the zero coefficient of autocorrelation of residuals, the DW statistic (almost) equaling 2, and by the lowest value of AIC. Hence, the selected autoregressive model AR(3) is specified in the following regression, where a_0 and a_i are the coefficients of the model and ε_t is its residual.

$$Milliq_t = a_0 + \sum_{i=1}^{3} a_i \times Milliq_{t-1} + \varepsilon_t. \quad (12)$$

Shocks of market illiquidity in week t, are designated by $Silliq_t$ (see Eq. 4) and obtained by extracting the estimated residuals, $\hat{\varepsilon}_t$ from the estimation results of the autoregressive model AR(3), which is expressed in Eq. 12.

Estimated shocks of market illiquidity on the Saudi Stock Exchange are plotted in Fig. 3. Fig. 3 shows that big shocks occurred during periods of the Saudi market turbulences that should cause illiquidity issues. Indeed, market illiquidity shocks appeared frequently from the start of 2002 until mi-2003. This period coincides with the stock market downturn of 2002 due to the internet bubble bursting. Illiquidity shocks also seem considerably high in 2006. During this period, known as the "Black February," the Saudi stock exchange collapsed, causing a loss of one trillion Saudi riyals. Estimated shocks were also significantly high in 2009, during the global financial crisis. Illiquidity shocks have appeared again frequently since 2015, during the fall of petroleum prices and the Chinese stock market turbulence. The occurrence of illiquidity shocks continued during the COVID-19 pandemic and the oil price crash of 2020, which affected the Saudi stock exchange, particularly the trading volume (AL-Najjar, 2022). Moreover, from Fig. 3, times series of $Silliq_t$ seems stationary. This is supported by ADF test results (statistic of ADF test equals to -31.846; probability is equal to zero).

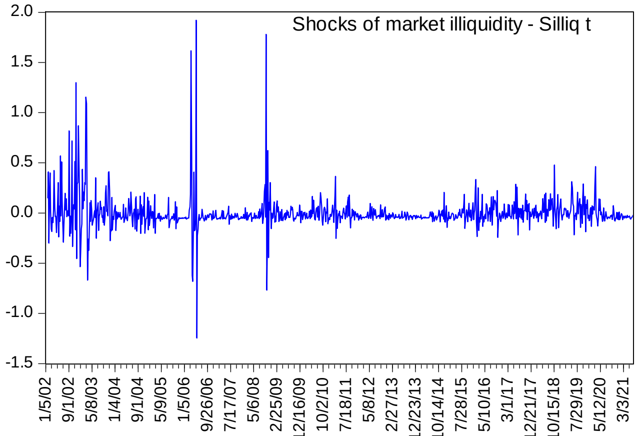

Fig. 3: Shocks of market illiquidity in the Saudi stock exchange (31-12-2001 to 30-6-2021)

In order to measure the sensitivities of portfolio returns to market illiquidity shocks and to test whether they change according to the firm size, I estimate separately the parameters of the regressions in Eqs. 10 and 11. Estimation results are summarized in Table 4.

Table 4: Sensitivities of weekly portfolios returns to market illiquidity shocks

Sized-portfolio	Coefficient	Estimates	p-value
Largest portfolio	α^L	-1.793	0.000
	β^L_{Silliq}	-7.235	0.000
Small portfolio	α^S	-1.549	0.000
	β^S_{Silliq}	-12.173	0.000

Estimation results in Table 4 indicate that the coefficient β_{Silliq} of each portfolio, measuring the sensitivity of returns to illiquidity shocks is negative and statistically significant. This implies that whatever the size of the firm, stock returns are negatively affected by market illiquidity shocks on the Saudi Stock Exchange. This result is largely consistent with those of previous studies. Amihud (2019) revealed a negative effect of illiquidity shocks on the returns of common stocks of the New York Stock Exchange (NYSE). Acharya et al. (2013) found that in addition to stock returns, returns of corporate bonds on the NYSE are also negatively impacted by illiquidity shocks. Lee (2011) confirmed globally the negative effect of market illiquidity shocks on stock returns. Bekaert et al. (2007) verified the negative relationship between stock returns and illiquidity shocks in emerging markets, using the "zero-return" ratio as a measure of illiquidity.

Table 4 also proves that the effect of market illiquidity shocks on returns depends on the firm size. The absolute value of the illiquidity beta of the smallest portfolio is higher than that of the largest portfolio. It equals 12.17 for the smallest portfolio, while for the largest portfolio, it equals 7.23. This implies that market illiquidity shocks drop the stock returns of smaller firms than those of larger firms. In other words, in the Saudi stock market, the more the firm size increases, the less its stock is sensitive to illiquidity shocks. This can be caused by the substitution of Saudi investors from less liquid stocks to more liquid stocks during shocks of market illiquidity, i.e., the flight to liquidity phenomenon, making stocks of large firms relatively more valuable, as explained in earlier studies. Indeed, Amihud (2002) and Acharya and Pedersen (2005) found on U.S markets that small stocks are more liquidity risky than large stocks, and they justified this by the fact that in times of dire illiquidity, large firms' stocks become more attractive, which reduce the negative effect of illiquidity shocks on their returns. Watanabe and Watanabe (2008) also confirmed that small stocks are more illiquid than large stocks and are more sensitive to market illiquidity shocks. Acharya and Pedersen (2005) explained that illiquid securities have higher illiquidity risk due to "flight to liquidity" in times of down markets or generally illiquid markets. Acharya et al. (2013) justified the higher sensitivity of small firms' assets to illiquidity shocks by the episodes of flight to liquidity during which securities of large firms become more attractive and unexpected rise in illiquidity may raise the prices of these assets that provide greater liquidity relative to the prices of less liquid assets.

4. Summary and conclusion

Research has demonstrated that shocks in market illiquidity negatively impact asset returns, with smaller firms experiencing a more pronounced effect than larger firms. This heightened sensitivity of smaller firms' assets to illiquidity shocks is often attributed to "flight to liquidity" episodes. During such times, investors swap their illiquid assets for those of larger firms, which are more liquid. This shift increases the price of the larger firms' assets and lessens their vulnerability to illiquidity shocks. The purpose of this study is to investigate the relationship between market illiquidity shocks and stock prices in the largest stock market in the Middle East, the Saudi stock exchange, and to determine if this relationship varies with firm size, as observed in previous research.

Using a comprehensive database containing daily data from all stocks listed on the Saudi stock market for over 20 years, I analyze the illiquidity levels of individual stocks and the market as a whole. The persistence of market illiquidity in Saudi Arabia is confirmed through an autoregressive model with three lags. From this model, I extract residual terms that represent innovations in market illiquidity or illiquidity shocks. These shocks are particularly significant during global financial crises and periods of falling oil prices. Additionally, I categorize stocks into two portfolios based on size to separately examine the impact of illiquidity shocks on returns for large and small firms. The results indicate that illiquidity shocks lead to immediate declines in returns across all stocks on the Saudi stock exchange, aligning with previous studies. Furthermore, the data reveals that larger firms have stocks that are less sensitive to market illiquidity shocks, echoing findings from prior research (Amihud, 2002; Bekaert et al., 2007; Watanabe and Watanabe, 2008; Acharya et al., 2013; Amihud, 2019). This suggests that during periods of significant liquidity shortages, Saudi investors prefer the stocks of larger firms, which offer more liquidity. This preference may explain why the negative impacts of market illiquidity shocks are less severe for larger firms in Saudi Arabia, similar to patterns observed in the U.S. and some emerging markets.

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

Acharya VV and Pedersen LH (2005). Asset pricing with liquidity risk. Journal of Financial Economics, 77(2): 375-410. https://doi.org/10.1016/j.jfineco.2004.06.007

Acharya VV, Amihud Y, and Bharath ST (2013). Liquidity risk of corporate bond returns: Conditional approach. Journal of Financial Economics, 110(2): 358-386. https://doi.org/10.1016/j.jfineco.2013.08.002

Al-Najjar D (2022). Impact of the twin pandemics: COVID-19 and oil crash on Saudi exchange index. PLOS ONE, 17(5): e0268733. https://doi.org/10.1371/journal.pone.0268733 **PMid:35594304 PMCid:PMC9122232**

Amihud Y (2002). Illiquidity and stock returns: Cross-section and time-series effects. Journal of Financial Markets, 5(1): 31-56. https://doi.org/10.1016/S1386-4181(01)00024-6

Amihud Y (2019). Illiquidity and stock returns: A revisit. Critical Finance Review, 8(1-2): 203-221. https://doi.org/10.1561/104.00000073

Amihud Y and Noh J (2021). Illiquidity and stock returns II: Cross-section and time-series effects. The Review of Financial Studies, 34(4): 2101-2123. https://doi.org/10.1093/rfs/hhaa080

Barardehi YH, Bernhardt D, Ruchti TG, and Weidenmier M (2021). The night and day of Amihud's (2002) liquidity measure. The Review of Asset Pricing Studies, 11(2): 269-308. https://doi.org/10.1093/rapstu/raaa022

Bekaert G, Harvey CR, and Lundblad C (2007). Liquidity and expected returns: Lessons from emerging markets. The Review of Financial Studies, 20(6): 1783-1831. https://doi.org/10.1093/rfs/hhm030

Ben Soltane H and Naoui K (2021). Time-varying responses of stock returns to market illiquidity: Stress scenario with regime-switching framework. International Journal of Finance and Economics, 26(1): 1611-1622. https://doi.org/10.1002/ijfe.1866

Bensoltane H (2023). Price behavior of small and medium enterprises on the Saudi stock exchange in the face of market illiquidity. International Journal of Advanced and Applied Sciences, 10(6): 113-118. https://doi.org/10.21833/ijaas.2023.06.014

Kim J and Kim Y (2023). Which stock price component drives the Amihud illiquidity premium? The North American Journal of Economics and Finance, 64: 101876. https://doi.org/10.1016/j.najef.2022.101876

Lee KH (2011). The world price of liquidity risk. Journal of Financial Economics, 99(1): 136-161. https://doi.org/10.1016/j.jfineco.2010.08.003

Lin C, Ko KC, and Lu CL (2023). Why is the Amihud (2002) measure priced in Taiwan: Illiquidity or mispricing? Pacific-Basin Finance Journal, 79: 101984. https://doi.org/10.1016/j.pacfin.2023.101984

Pástor Ľ and Stambaugh RF (2003). Liquidity risk and expected stock returns. Journal of Political Economy, 111(3): 642-685. https://doi.org/10.1086/374184

Watanabe A and Watanabe M (2008). Time-varying liquidity risk and the cross section of stock returns. The Review of Financial Studies, 21(6): 2449-2486. https://doi.org/10.1093/rfs/hhm054