

The Jordanian capital market: Liquidity cost during COVID19 pandemic infection

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CHRONICLE

ABSTRACT

Article history:

Received: November 15, 2020

Received in revised format:

January 28 2021

Accepted: March 2, 2021

Available online:

March 2, 2021

Keywords:

Covid-19

Amman Securities Exchange

Liquidity Cost

Bid-Ask Spread

Risk

Stock Price

Number of Contracts

The COVID-19 outbreak has affected the entire global financial market in an unprecedented way. Due to disruptions in the global market, the Jordanian financial market also responded to the pandemic and observed sudden volatility. The outbreak of the virus has led the management of the Jordanian market (Amman Securities Exchange / ASE) to halt trading on the secondary market during the period 17 March 2020 – 9 May 2020. Hence, using daily closing prices of listed firms, this paper empirically examines the market's liquidity cost before its closure (2 January 2020 – 16 March 2020) and after (10 May 2020 – 31 December 2020). The premise of this objective rests on the fact that the trading activity on the secondary market, following the resumption of trading is carried- out within uncertain circumstances. The data used in this study comes from the daily trading reports published by ASE. All listed companies are included in the analysis. Based on the daily closing bid and ask prices, we calculate the daily spreads during two sub-periods (2 January 2020 – 16 March 2020 and 10 May 2020 - 31 December 2020). We then regress the daily spreads on daily stock prices, number of daily contracts, risk, and where the companies list their shares (first or second market). The main findings of this paper are threefold. First, liquidity cost in the ASE is relatively high. Second, following the resumption of trading on the secondary market, liquidity cost has increased. Third, other known determinants of liquidity cost are significant and have the expected coefficient signs. The fact that liquidity cost in the ASE is high, and higher even after the resumption of trading, necessitates some clear policy measures. These include a reduction in the currently used minimum tick.

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1. Introduction

The Covid-19 pandemic has brought a shift in focus away from the traditional array of “as usual” business risk. The pandemic has in fact, affected a number of channels, including labor markets, global supply chains, and consumer behavior. Although the overall economic impact still revolves, recent studies indicate that the level of risk in all countries increased dramatically in March when COVID-19 spread to more than 200 destinations (Gormsen and Koijen, 2020 and Zhang et al., 2020). By the end of March, however, governments and central banks have adopted a wide range of economic policies to reduce the impact of the lockdowns and reduce fear caused by the pandemic. Global financial markets have reacted sharply to the coronavirus outbreak. Preventive actions, as well as consecutive warnings of new cases and deaths, have generated enormous risk in the financial and commodity markets. The pandemic has caused not only chaos to financial markets, but also a crisis in real economies. The outbreak has put markets around the world under great stress and led to unprecedented uncertainty. Due to the strong impact of

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COVID-19 on the stock market, governments around the world have imposed bans and restrictions (e.g. short selling bans) to reduce the risk of market collapse, reduce volatility, and protect market stability (Kodres, 2020). Indeed, all countries and international investors were bound to be influenced by the speculative news about how deadly the virus is, when a vaccine will be available, and how governments plan to respond to the crisis. Since the beginning of the year, the S&P 500 index has fallen by 31.32% on March 23 and its daily minimum index hit a -12.77 percent mark. Other world share indices absorbed the extreme risk and behaved similarly.

Earlier stock market volatility was undoubtedly due to the overreaction of investors, and driven by several factors, including intensive media coverage. The global integration of stock markets may also partially explain the first wave of panic in the markets, which was quickly controlled, and panic subsequently dissipated, with buying and selling movements beginning to re-emerge around the world. Despite the well-anticipated effects as of March 2020, we still do not know much about how COVID-19 empirically affects emerging stock markets following the measures taken. In addition, the growing number of countries that brought the spread of the virus under control by mid-April could lead to ambiguity about what effect the pandemic will have on emerging stock markets. As a subset of almost most financial systems across the globe, stock markets are important for two reasons. First, investors do not have a problem in investing in liquid stock markets and hence, financing projects that need long-term capital commitments. Indeed, in liquid markets, investors can quickly sell their financial securities on the secondary market. This argument, due to Ross (1991), is the “level effect”. Second, the fact that stock markets enable investors to diversify their portfolios, such markets encourage them to shift their portfolios to riskier and hence, higher return investments. Again, this argument, due to Greenwood and Jovanovic (1990), is the “efficiency effect”.

The above-mentioned arguments explicitly raise the importance of stock market liquidity. Liquidity, as more commonly known, operational efficiency, enables investors to transact their orders (buy or sell) quickly or immediately without much impacting price (low cost). There are other benefits too. For example, the literature reports a positive relationship between liquidity and stock returns. This implies that companies with higher liquidity tend to have lower cost of capital (Brennan and Subrahmanyam, 1996). These benefits of the liquid stock market have encouraged researchers to measure liquidity cost and examine its determinants. Some of the classical efforts in this area include Demsetz (1968), Tinic (1972), and Tinic and West (1974). Within the context of the above-mentioned arguments in general, and the arguments about stock market liquidity in particular, this paper examines liquidity cost that prevails in the Jordanian capital market. The premise of the paper rests on what has already become clear. COVID-19 has caused great uncertainty and has resulted in increasing levels of volatilities in stock markets all over the world. The aim is to investigate whether or not COVID-19 led to an increase in the liquidity cost of listed Jordanian corporations.

We divide the rest of the paper as follows. Section 2 briefly reviews the literature. In section 3, we provide some basic information about the ASE. In section 4, we outline the data and methodology, and then present and discuss the findings. Finally, and based on the results, in section 5, we put forward a number of recommendations whose implicit objective is to enhance the liquidity of the ASE.

2. Literature Review

During the past decades, several studies have focused on investigating the impact of pandemics on stock market performance (Jiang et al., 2017; Liu et al., 2020). For instance, Chen et al. (2007) examined the impact of the SARS pandemic on the Taiwan stock market and found a negative relationship between the out-break of SARS and its performance. On the other hand, Jiang et al. (2017) investigated the relationship between the H7N9 influenza virus outbreak and China's stock price performance and found that the increase in the number of daily cases negatively impacted stock prices. Similarly, Ichev and Marinc (2018) found that the Ebola virus has had a major impact on the US stock market in different ways, and that smaller companies' stock returns were more influenced by Ebola than larger firms.

Several studies have also paid attention to the impact of the COVID-19 lockdown on stock market performance. For example, Baig et al. (2020) found that the lockdown has led to a decline in US stock market liquidity. Meanwhile, Eleftherio and Patsoulis (2020) measured the effects of the COVID-19 lockdown and social isolation on stock market indices in 45 countries and found a negative relationship between the lockdowns and the performance of international stock markets. However, they did not specify the impact of the Lockdown on each specific country. Similarly, Zaremba et al. (2020) examined the effect of the pandemic on the performance of stock markets in 49 countries and document deterioration in liquidity. In general, previous studies have examined the impact of the pandemic on stock markets around the world. However, no such study has looked at the ASE in terms of its interplay with COVID-19. The contribution of this paper rests on being the first that looks at liquidity cost in the ASE during COVID-19 circumstances. When they trade in financial securities, all investors must pay commission fees and liquidity costs. The commission part, which is paid to brokers, can be a fixed proportion of the executed contract or negotiable. Regardless, no investor can avoid this cost because stock brokers who execute all transactions. The interesting part,

however, is liquidity cost. After all, this part varies between securities, and as mentioned in the introduction, the return of more liquid securities tend to be higher. As long as 1968, Demsetz (1968) stated that market makers provide “predictive immediacy”, and the difference between their bid-price and ask-price (spread) is the implicit cost that any investor pays. Within this context, in many stock markets around the world, including the ASE, the trading mechanism does not involve market makers. In other words, their market-making mechanism is order-driven. In order-driven markets, there are clear pricing and timing rules. For two or more buy orders, the order with the highest price has the execution priority when a counter sell order comes forward. For any two or more sell orders, the order with the lowest price has the execution priority when a counter buy order comes forward. As far as the timing priority is concerned, when two or more sell (buy) orders have the same price, the first registered order has the execution priority.

The literature contains few theoretical models for liquidity cost. These include the order - processing cost (Demsetz, 1968, Glosten and Harris, 1988, Stoll, 1989, and Madhavan and Smidt 1991), adverse selection cost (Bagehot, 1971 and Glosten and Milgrom, 1985), and inventory control cost (Stoll, 1978, Ho and Stoll, 1981, and Amihud and Mendelson, 1980). These theoretical works have led numerous researchers to examine what factors determine liquidity cost. On average, the literature that examines liquidity cost regresses a measure of liquidity cost on a set of characteristics that include the number of contracts or trading volume, risk (volatility of stock price), market on which the security is listed (first or second / parallel), and stock price. This literature points out that while the impact of stock price and trading volume on liquidity cost is negative, the impact of risk is positive. In addition, the literature hypothesizes that the liquidity cost of firms listed on the first market tends to be lower. Some of the early papers that examine the determinants of liquidity cost include Benston and Hagerman (1974), Glosten and Harris (1988), Sarin et al. (1997), Attig et al. (2003), Zheng and Zhang (2006), Frino et al. (2008), and Agudelo (2010). For example, Frino et al. (2008) examine the Italian stock market within the context of its 2001 structural move from an order driven market to a market where market makers provide liquidity. As expected, this change led to a decrease in the bid-ask spread of listed firms. Recent papers that examine liquidity cost include Chai et al. (2012), Chung and Hrazdil (2016), and Jacoby and Zheng (2018), Sheng, et al. (2019), and Su and Tokmakcioglu (2021). For example, Su and Tokmakcioglu (2021) examine Turkish sovereign bonds in terms of their liquidity cost. Their results indicate that bonds with shorter time to maturity, and higher trading volume have lower or narrower spreads. Arab stock markets have been examined as well. For example, Omet et al. (2015) looked at the Dubai and Abu Dhabi stock markets and examined the impact of reducing the minimum tick on their liquidity costs. The impact, it is reported, is positive. The reduction in the minimum tick has led to a reciprocal decrease in liquidity cost. In addition, Omet et al. (2015) examined listed Jordanian banks in terms of their liquidity cost. Based on a total of 15 banks and the time-period 2012 – 2014, the results show that while stock price, and trading volume reduce liquidity cost, risk widens bid-ask spreads.

3. Performance of the Amman Stock Exchange (ASE)

In its first year since establishment (1978), ASE had 66 listed companies with a market capitalization equivalent to \$410 million. In 2020 - 2021, the market lists 179 companies with a market capitalization of about \$18.5 billion. These increases, however, do not reflect the reality of the growth performance of the ASE.

First, since its inception, the market has been volatile, for example, the annual change in the market’s price index has been volatile. For example, the index witnessed an increase of 92.9 percent in the fiscal year 2005, -32.6% in 2006, and then 36.3 percent in 2007.

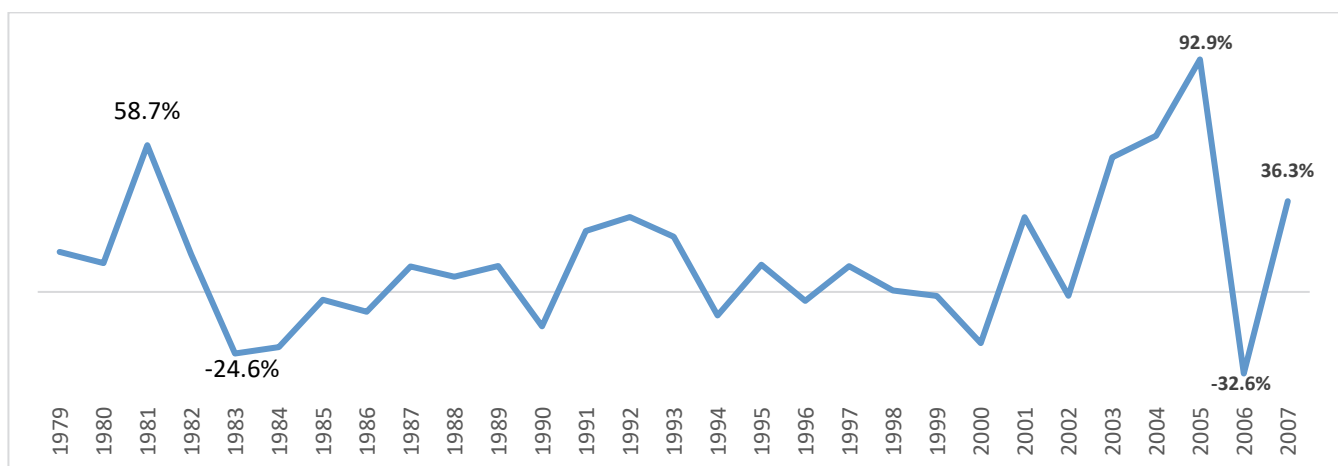


Fig. 1. ASE's Price Index / Weighted by Capitalization (Annual Changes)

Second, the index has been realizing consistent negative returns since the year 2008. In contrast, and with the exception of 2020, the growth rate of real Gross Domestic Product (GDP) has been positive.

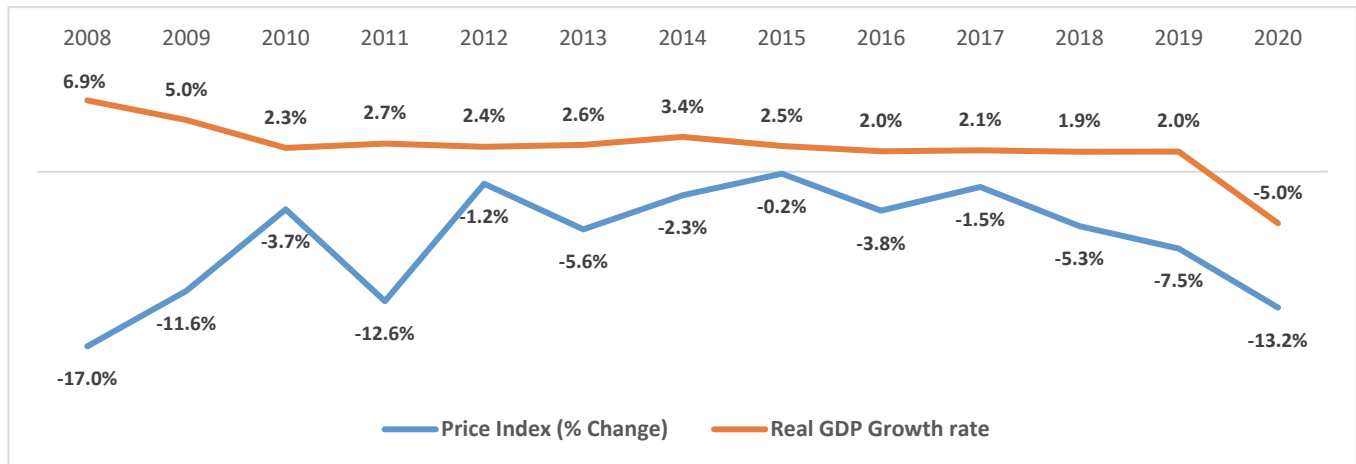


Fig. 2. Real GDP Growth Rate Versus ASE's Price Index Returns

4. The Data, Methodology and Results

The data used in the analysis comes from the daily trading reports published by ASE. All listed companies are included in the analysis. Based on the daily reported closing bid and ask prices, we calculate the daily spreads for all listed stocks during two sub-periods: The first period covers 2 January 2020 – 16 March 2020. The second period covers 10 May 2020 - 31 December 2020. As mentioned in the introduction, trading on the ASE's secondary market was halted during the period 17 March 2020 – 9 May 2020.

In this paper, we investigate the impact of COVID-19 on stock market liquidity. The spread measure is a low-estimator of bid-ask spreads, computed using the daily closing bid and ask prices. It is a good proxy measure that captures the effective bid-ask spread (Fong et al., 2017; Gao et al., 2020, Ahn et al., 2018).

$$SPREAD_{i,t} = [(Ask_{i,t} - Bid_{i,t}) / ((Bid_{i,t} + Ask_{i,t}) / 2)] \times 100 \quad (1)$$

where, Spread refers to the percentage bid-ask spread of stock i at the end of trading day t , Ask is the ask price and Bid is the bid price at the end of day t .

Based on the calculated spreads, we estimate the following model for each of the two sub-periods

$$SPREAD_{i,t} = \alpha_0 + \alpha_1 \ln(PRICE_{i,t}) + \alpha_2 \ln(CONTRACT_{i,t}) + \alpha_3 (RISK_{i,t}) + \alpha_4 (MARKET_{i,t}) + \varepsilon_{i,t} \quad (2)$$

In addition, we estimate the following model for the whole period. If COVID-19 has had an impact on liquidity cost, the coefficient of DUMMY will be positive and significant.

$$SPREAD_{i,t} = \alpha_0 + \alpha_1 \ln(PRICE_{i,t}) + \alpha_2 \ln(CONTRACT_{i,t}) + \alpha_3 (RISK_{i,t}) + \alpha_4 (MARKET_{i,t}) + \alpha_5 (DUMMY) + \varepsilon_{i,t}$$

SPREAD is the bid-ask spread (as defined above) in day t . PRICE is the natural logarithm of one plus the daily opening stock price. We added plus one because many stock prices are below one Jordanian Dinar. CONTRACT is natural logarithm of the number of transactions. RISK is the difference between the highest and lowest daily prices, divided by the opening price. MARKET is a binary number equals zero if the company lists its shares on the main market, and one if listed on the second market. DUMMY is a dummy variable that takes the value of zero for the first sub-period and one for the second.

In Table 1, we report the overall mean values of the dependent variable (spread) and the independent variables in the two sub-periods. The reported values reveal a number of interesting observations.

Table 1
Mean Values of Variables

Variable	1 st Sub-Period		2 nd Sub-Period	
	Mean	Std. Deviation	Mean	Std. Deviation
SPREAD	0.029	0.192	0.031	0.199
PRICE	1.166	1.910	1.247	2.258
CONTRACT	21.867	33.637	22.268	35.084
RISK	0.021	0.021	0.023	0.022

Following the opening of the market (second sub-period), the mean value of the spread (3.1 percent) is higher than before closure (2.9 per cent). The standard deviation of the spread is also higher in the second sub-period. Clearly, these observations are the result of greater levels of uncertainty caused by COVID-19. In addition, we can state that liquidity cost in the ASE is relatively high. For example, this cost is equal to 0.0181 percent in the NYSE and 0.0373 percent in NASDAQ (Jiang, 2011). This cost is also equal to 0.331 percent and 0.213 percent in European exchanges and Canada respectively (Gagnon & Gimet, 2013). In China, this cost is equal to 0.217 percent (Ding et al., 2013).

The overall mean price of all stocks has increased during the second sub-period from 1.166 Jordanian Dinars to 1.247 Dinars. Interestingly, however, the standard deviation of the closing prices has increased significantly. Again, we can argue this is due to the resultant higher uncertainty during the second sub-period. As far as the mean number of contracts and risk are concerned, there does not seem to be much difference between the first and second sub-periods.

In Table 2, we report the unit root test results.

Table 2
Unit Root Test Results

Variables	Levels			1 st differences			Integrated order
	τ_r	τ_μ	τ	τ_r	τ_μ	τ	
SPREAD	-1.153	-2.685	-0.873	-4.073***	-4.045***	-3.882***	I(1)
Price	-2.356	-1.432	-0.911	-9.536**	-9.435***	-9.817***	I(1)
Contract	-3.244	-2.234	-0.722	-3.213**	-3.613**	-3.853***	I(1)
Risk	-2.556	-2.476	-0.107	-2.990*	-2.939*	-3.101***	I(1)

Note: τ_r , τ_μ , τ symbolize t test of ADF with trend and intercept, intercept and without trend and intercept at %, %5 and 10%.

To make the empirical analysis more comprehensive, the Engle-Granger test has been used to check for the existence of a cointegration relationship. The results reveal that a long-term relationship exists and this indicates that all variables move in the same direction in the long term. In addition, and to check multicollinearity, the variance inflation factor (VIF) analysis is used. The results reveal that there is no multicollinearity among the variables.

Table 3
Engle-Granger Test (Co-Integration Test) and VIF Results

Variable	Cointegration Test		
	Coefficient	T- test	P- value
Engle Granger Test	-0.6543	-5.6589	0.0039
Variable	Variance Inflation Factor		
	Coefficient	Un-centered VIF	Centered VIF
SPREAD	0.2996	25.192	1.2563
PRICE	0.0365	8.7546	1.2659
CONTRACT	0.1065	7.9856	1.3654
RISK	0.7523	2.0325	2.0288

In Tables 4 and 5, we report the regression results. Again, the reported values reveal a number of interesting observations. First, price has a coefficient equal to -0.305 and -0.213 in the first and second sub-periods respectively. This implies that stocks that have higher prices, on average, tend to have lower liquidity cost. However, it is useful to note that the coefficient in the second sub-period is lower, and probably, this is due to the rising prices during the second sub-period.

Second, the impact of the number of daily contracts on spread is also negative. Indeed, this is one would expect because stocks with higher trading activity tend to have lower liquidity cost.

Table 4

Regression Results: Two Sub-Periods

Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
PRICE	-0.305	-21.734*	-0.213	-24.648*
CONTRACT	-0.342	-27.408*	-0.395	-49.608*
RISK	+0.333	26.054*	+0.336	40.384*
MARKET	+0.113	8.113*	+0.195	22.535*
Adjusted R ²	0.353	Adjusted R ²	0.339	
F-Statistic	72.757*	F-Statistic	68.606	

*Significant at the 99 percent level.

Third, the impact of risk on spread is positive and significant. Again, this is what one would expect. Higher levels of volatility imply wider bid-ask spreads.

Fourth, the impact of the binary number for the first and second markets is positive and significant. This finding implies that stocks listed on the second market have higher liquidity cost. This is also not surprising given that companies listed on the first market are larger, older, and more known by investors.

Finally, the most interesting result is the coefficient of the binary number for the two sub-periods. It is positive (+0.025) and significant. This implies that the mean spread value in the second sub-period is higher than in the first period. We can argue this is due to the resultant higher uncertainty during the second sub-period.

Table 5

Regression Results: Whole Period

Variable	Coefficient	t-Statistic
PRICE	-0.234	-31.948*
CONTRACT	-0.382	-56.873*
RISK	+0.336	48.100*
MARKET	+0.174	23.735*
DUMMY	+0.025	4.149*
Adjusted R ²	0.342	
F-Statistic*	91.075	

*Significant at the 99 percent level.

These results are consistent with the extant literature that indicates market returns react adversely to any political, economic or/and natural crises (Lee & McKibbin, 2004, Elnahas et al., 2018, Huang et al., 2018, Al-Awadhi et al., 2020, and Goodell, 2020).

5. A Summary and Conclusions

This paper has examined the Jordanian capital market in terms of liquidity cost. The motivation behind this paper is the outbreak of COVID-19, and its resultant closure of the market. The results indicate that liquidity cost in the ASE is relatively high, and following the opening of the market, this cost has become even higher. However, the fact that liquidity cost is high, relevant stakeholders should re-examine this issue (irrespective of the increase) and adopt the necessary remedial measures.

Based on the international experience and evidence, the remedial measures can be immediate and in the near future. The immediate measure should be a reduction in the minimum tick. It does not make sense to maintain a minimum tick of one pence regardless of the companies' stock prices. After all, there are companies whose stock prices are higher than 10 Jordanian Dinars while others are below one Dinar. The near future recommendation should be the introduction of market makers to the market. Again, the international experience and evidence show that market makers enhance liquidity, and reduce liquidity cost. This implies that governments and regulators should act actively to stimulate stock market liquidity as well as support the affected industries. Future research might go further to broaden their time period and include more emerging markets, especially after different countries announcing recovery plans and earnings release.

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