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Role of Market Liquidity in Stock Prices and Expected Returns: A Test on the Borsa Istanbul[1]

Piyasa Likiditesinin Pay Fiyatlarındaki ve Beklenen Getirilerdeki Rolü: Borsa İstanbul'da Bir Test

Gönül ÇİFÇİ[2]

Öz

Amaç: Bu araştırma piyasa likiditesinin pay piyasası fiyatları üzerinde bir etkisinin olup olmadığını ve ek getirileri tahmin etmede kullanılabilir mi sorusunu Borsa Istanbul özelinde incelemeyi hedeflemektedir.
Tasarım/Yöntem: Çalışmada altı faktör olarak isimlendirdiğimiz bir varlık değerleme modeli ile likiditenin piyasa fiyatları üzerindeki etkisi test edilmiştir. Bu altı faktör; piyasa getirisi faktörü, büyüklük faktörü, temerrüt primi, vade primi, piyasa likiditesi ve piyasa/defter değeridir. Veri seti BIST 100 endeksinde yer alan 57 şirketin 130 aylık verisini kapsamaktadır. Araştırmanın zaman aralığı ise Ocak 2011 ile Ekim 2021 aralığında sınırlandırılmıştır.
Bulgular: Araştırma dönemi içerisinde piyasa likiditesinin piyasa getirileri üzerinde etkili olduğu bulunmuştur. Uzun dönemde piyasa likiditeye duyarlıdır. Likiditenin, fiyatlar için en önemli faktör olduğu bulunmuştur. Piyasa likiditesi ile fiyat arasındaki ilişki uzun dönemde pozitif iken bu ilişki kısa dönemde negatiftir. Kısa dönem ilişkisinde likidite anlamlı olsa da piyasanın likiditeyi fiyatlandırmadığı sonucu elde edilmiştir.Likiditenin getiriler üzerindeki etkisi hem kısa hem de uzun dönemde anlamlıdır.Ancak bu etkiler sınırlıdır.
Sınırlılıklar: Altı faktör modeli bir gelişen piyasa olan Borsa Istanbul'un BIST 100 endeksi içerisinde işlem gören paylar için gerçekleştirilmiştir. Sonuçlar likiditesi daha düşük paylar ve farklı piyasalar için farklılıklar gösterebilir.
Özgünlük/Değer: Piyasa likiditesinin paylar üzerindeki fiyat etkisi koşulsaldır ve ek getiriler likiditenin sıfıra yakın olabilme ihtimali nedeni ile değişebilir. Her ne kadar likidite riski piyasalar için bir risk faktörü olsa da bazı içsel ve dışsal faktörler likiditenin piyasa üzerindeki gücü değişiklik gösterebilir. Bu sonuçlar piyasalar ve yatırımcılar tarafından dikkate alınmalıdır.
Anahtar Kelimeler: Piyasa Likiditesi, Likidite Riski, Piyasa Getirisi, Gelişmekte Olan Piyasalar, Beklenen Piyasa Getirisi

Abstract

Purpose: This study searches if market liquidity impacts the stock market prices and forecasts excess returns for Borsa Istanbul.

Design/Methodology: The six factors' effects over the market are tested. The factors are market return factor, size factor, default premium, term premium, market liquidity, and market-to-book values.The data set covers 130 monthly data of the fifty-seven stocks of BIST100 index. The research period is delimitated from January of 2011 to October of 2021.

Findings: The market liquidity is significant for the returns over the research period. The market was sensitive to the liquidity in the long-term. It is the most important factor for the prices. The market liquidity and price relation is positive in the long-term, whereas it is negative in the short-term. Even though the liquidity is significant for the short-term, the market didn't price the liquidity. Its effects on the returns are significant both for the short and long-term. However, those effects are limited.
Limitations: The model tested for stocks that traded on BIST100 index which is one of emerging markets. The results may be dissimilar for less liquid stocks and for different markets.
Originality/Value: The price effect of market liquidity for stocks is conditional and the excess return changes because of liquidity around the zero. Though liquidity risk is a risk factor for the markets.Some internal and external factors may affect the liquidity's power over the market. Those results should be taken attention by markets and investors.
Keywords: Market Liquidity, Liquidity Risk, Market Return, Emerging Markets, Expected Market Return

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1.INTRODUCTION

Liquidity is an indispensable factor for financial markets because it is necessary to succeed in long-run development with market efficiency and to promote asset trading and fund transferring (Butler et al., 2005). It is also important for market returns and prices. The relationship of liquidity, price, and return is a kind of vicious circle. Market returns (Acharya & Pedersen, 2005) and asset prices are affected by liquidity (Amihud, 2019; Sterenczak, 2021) and vice versa.

Investors and markets are interested in liquidity. The investors monitor liquidity to evaluate the market risks, to understand how market prices will be, and to save their rights (Okoroafor & Leirvik, 2024). On the other hand, many markets such as bond markets (Lin et al., 2011; Goldberg & Nozawa, 2021) and stock markets (Li et al., 2019) do that to predict future returns (Bekaert et al., 2007). Under conditions of illiquidity, investors will demand excess returns, especially for liquidity-sensitive assets (Amihud & Mendelson, 2006; De Jong & Driessen, 2006; Pereira & Zhang, 2010; Lin et al., 2011). Therefore, illiquidity (or liquidity risk) should have a positive relation with market prices and returns as Pastor and Stambaugh (2003) mentioned.

High liquidity risk means high expected returns for investors. The markets should fulfill the investors' demands as a reward for bearing liquidity risk if they want to convince the investors to stay in the markets. Otherwise, investments will be shifted to liquid markets that causes a worse liquidity risk for the illiquid market (Subramanian & Jarrow, 2001). Those effects of liquidity are valid for the developed (Marozva, 2019; Iwanaga & Hirose, 2022) and emerging markets (Ma et al., 2020; Chen et al., 2023). However, its effects vary beyond the markets which are more intense in emerging markets (An et al., 2020).

The emerging markets are characterized by the lower quality of available data, political and institutional instability, and greater vulnerability to speculative capital (Leite et al., 2018) which makes their structures risky. Beyond those factors, the markets have close structures due to low integrations with the global markets. Those restrictions doubt investors (especially international investors) to enter the markets, the markets have difficulty finding funds, thereby fund cost increases (Hearn, 2010; Donadelli & Prosperi, 2012), and increase the liquidity's adverse effects on the prices and returns. Additionally, Bekaert et al. (2007) and Donadelli and Prosperi (2012) expressed that emerging markets are ideal for determining the effects of market liquidity on stock returns. However, there is a gap in the role of liquidity in asset pricing in emerging markets. There is a bunch of studies on of liquidity and returns or prices. The domination of those studies verifies inverse relations of liquidity, prices, and returns in the developed markets but the relations are not accurate in emerging markets. This study aims to fill that gap by highlighting if the market liquidity is an effective factor for asset prices in emerging markets. The Turkish stock market was selected for that purpose.

Turkiye is one of the emerging-7 (E7) markets which struggled with local and international liquidity crises. Besides its experiences with the crises, the Turkish stock market (Borsa Istanbul)'s efforts in liquidity management lead this study to Borsa Istanbul (BIST). BIST had adopted new rules and established a new trading platform to accelerate the transactions for increasing liquidity. Relying on its features and efforts, the Turkish stock market is eligible to reveal the role of liquidity for the prices.

Despite the effects of liquidity among market prices and returns, the mass of the asset pricing theories; like as Sharpe (1964) and Lintner (1965)'s capital asset pricing model (CAPM), Fama and French (1993) three-factor model (FF3F), and Fama and French (2015) five-factor model (FF5F) ignores the liquidity. That may cause asset mispricing, inaccurate return expectations, and/or investor loss. Plus, the vast of emerging markets are not exactly satisfied the standart of the CAPM (Altay and Çalgıcı, 2019). Thus, another approach which was proposed by Lin, Wang, and Wu (2011) is adopted in this study. Lin, Wang, and Wu (2011)'s six-factor model (LWW6F) created a new asset pricing model by incorporating liquidity factor to CAPM and FF5F models. The international investors monitor blue chip indices and stocks to decide whole markets' liquidity levels (Hearn, 2010). Because of that leading position of the BIST100 as a blue chip index, the LWW6F was run for the stocks in the BIST100 index.

This study may be the first one to contribute to how the market liquidity impacts the stock prices in an emerging market by running LWW6F; moreover, it showed the utility of the LWW6F model for the stock markets. The results demonstrated the market is sensitive to the *MKT, SMB, HML, L,* and *DEF* factors in the long-term test. The market liquidity is the most effective factors and it affects the stock prices both in the short and long-run on the Borsa Istanbul (BIST). However, its effect over the prices is negative in the short-run and positive in the long-run. The liquidity is effective over the expected returns, as well. Whereas, that effect is not as strong as the other significant factors. Those outputs demonstrated if the liquidity impacts the stock prices and how its effect changes on time-basis. Therefore, the results are important for the investors and markets to use in asset pricing, risk management, portfolio selection, and wealth management who cares liquidity and return relationship on the BIST and the results may be helpful for the other emerging markets. The policymakers can adjust the rules of markets to attract international funds by using those results.

The remaining of the study is organized as follows: The section 2 is the methodology. The dataset, sampled stocks, liquidity and return measures, and econometric methods are defined in that section. The section 3 shows the econometric results and discussion, section 4 is the conclutions.

1.2. Literature Review

Many factors like as the volatility of markets (Akbaş, 2011) or economies (Moshirian et al., 2017), value and size of the market (Foran et al., 2014), company-size (Çakıcı & Zaremba, 2021), book-to-market value, and asset's risk, being a bear/ bull market, market risk premium, and value risk factors (Sterenczak, 2021) can cause liquidity risk in financial markets. The markets' reactions decide the prices and returns of the assets. Fund managers' abilities for liquidity timing in a company (Yalçın & Dube, 2023), market announcements (Baglioni et al., 2022), and positive / negative liquidity shocks (Iwanaga & Hirose, 2022) impact markets' reactions to the liquidity risks. The markets' reactions shape the relationship of liquidity with prices & returns. If investors negatively react to illiquidity, the prices should be enlarged. That inverse relationship isn't valid for every markets according to previous studies results.

The domination of existing studies verifies inverse relations of liquidity risk, prices, and returns in the developed markets but the relation is not accurate in emerging markets. The returns have an asymmetric movement with liquidity risk on the Tokyo Stock Exchange (Chang et al., 2009), but Iwanaga and Hirose (2022) deduced that positive shocks will have higher expected returns than the stocks with negative shocks in Japanese stock markets, while the investors mostly react to positive shocks than negative shocks. The inverse relation exists on the NASDAQ (Zhang & Ding, 2018), on the Johannesburg Stock Exchange (Marozva, 2019), on the UK markets (Hubers, 2012; Foran et al., 2014), on the Australian market (Vu et al., 2014), on the NYSE (Bradrania et al., 2015), on the AMEX (Chordia et al., 2001; Uddin, 2009; Kim & Na, 2018), and on crude oil market of the USA (Okoroafor & Leirvik, 2024), as well. In compare of the developed and emerging markets, Moshirian et al. (2017) tested liquidity- return relationship among 39 markets and concluded the liquidity has effects over the returns of the all markets but its effect is stronger in the developed markets than the emerging markets. Bekaert and Harvey (1997) and Batten and Vo (2014) expressed the necessity of the liquidity for the developed markets. The developed markets should be much more worried for the liquidity than the emerging markets, due to intense integration with the global economies. Because of that connectedness of the developed markets they are more fragile than emerging markets to liquidity risk (Bekaert & Harvey,1997; Batten & Vo, 2014). The high integration with the global markets may harm the domestic markets because of risk transferring from the global to domestic markets. In addition to global economy's effects, liquidity level of a domestic and developed market impacts the returns, unlike emerging markets. Therefore, the developed markets may face the liquidity risks more often. On the other hand, Bekaert et al. (2007) and Donadelli and Prosperi (2012) expressed that emerging markets are ideal to observe how market liquidity can impact stock returns. Unlike the developed markets, the inverse relation is not valid for the all emerging markets. There are some different results among the emerging markets. China is one of the biggest emerging market and there are some studies researched how the liquidity risk and returns are related in Chinese markets. Narayan and Zheng (2011) revealed an inverse relation between the return and liquidity both on the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE). Shih and Su (2016) concluded that relationship is valid just if the

market liquidity declines. Unlikely, the returns don't change while the liquidity is rising. Ma et al. (2020) mentioned that the liquidity risk of a portfolio can have structural changes over time and the liquidity risk premium is negative between 2002 and 2016. That negative liquidity risk premium can be a result of sellers preferences to compensate buyers when stock prices crash. An et al. (2020) deduced the liquidity risk is more important for returns on the Chinese stock market in compare of the US markets. The liquidity premium had increased since 2011 while it was decreasing on the US market. Zhang and Lence (2022) found that the effects of liquidity over the stock returns was more remarkable sub-periods of 1994–2004 and of 2005–2019 on the SHSE and SZSE. Kumar and Misra (2019) revealed the systematic liquidity risk is significant for asset returns through various channels on the Indian stock markets, as well. However, Chen et al. (2023) showed Thailand stock market was suffered because of extreme illiquidity. Therefore, investors demand higher retuns as the compensate of their worries. Extreme illiquidity causes a significant return premium for stocks and it can forecast the stock returns to at least for one-year horizon.

In a common sense, the excess returns should be higher in emerging and frontier markets than the developed markets to prevent liquidity gap. Nonetheless, illiquidity doesn't necessarily mean low returns for every markets. Some markets may be neglected to liquidity risk or have different connection with the liquidity. Quirós et al. (2017) concluded that the market liquidity and returns doesn't have a relationship on the Euronext Lisbon Stock Exchange. Musneh et al. (2020) supports that opinion by concluding that liquidity risk doesn't impact the returns, because the illiquidity was not priced on the Malaysian stock exchange. Whereas, Musneh et al. (2021) showed that relation changed in different sectors. The most of the returns are positively correlated with market illiquidity, whereas it is negatively correlated with stocks illiquidity. Maharani and Narsa (2023) demonstrated there is a significant relationship between the six-factor capital asset pricing model, intellectual capital, and excess stock returns on the Indonesia Stock Exchange. Carvalho et al. (2022) deduced the Latin-American emerging stock markets (Brazil, Chile, Colombia, Mexico, and Peru) priced the market liquidity between the July of 2000 and the June of 2018 according to FF3F, FF5F, and Carhart four- factor models.

The inverse effect of the illiquidity over the returns and prices is not clear tough it is common for every stock markets. The different conclusions of the existing studies are concerning markets' different characteristics (Maharani & Narsa, 2023). The dilemma over the results inspired us to test the relation for the Turkish stock market. Demir et al., (2008) concluded that the liquidity positively impacted the weekly returns of the stocks both of highest and lowest book-to-market value companies during 1994 economic crise on the Turkish stock market. Ünlü (2013) mentioned importance of the liquidity risk for prices on the BIST. Atılgan et al. (2015) revealed neither the firm size nor book-to-market ratio is important for returns. The market liquidity is the most important factor for expected returns. Kaya (2021) tested FF5F on the Borsa Istanbul. The regression estimations findings provide evidence that the size and value premiums are significant, but these premiums are not strong. On the other hand, the market premium is an important factor for the BIST. This finding demostrates profitability premium of liquidity but liquidity isn't unambiguously strong in explaining the stock returns on the BIST.

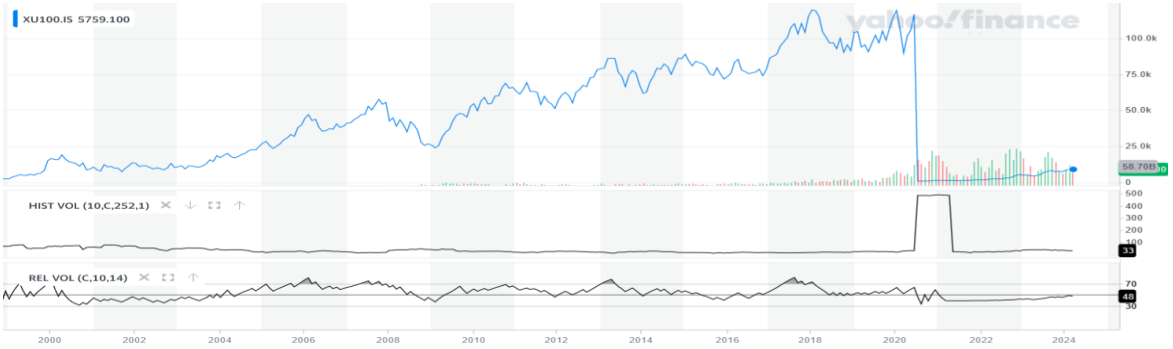
2.METHODOLOGY

The sample, data, variables, and methods are explained in this section. The data set covers 130 monthly data of the fifty-seven stocks of BIST100 index. The Amihud (2002) illiquidity ratio (AIR) and LWW6F models were discussed. The relationship of liquidity and stock prices was tested with Fama and MacBeth (1973) cross-sectional regression test.

2.1.Time Range and Sample Selection Process

Turkiye is one of market of Emerging-7 (E7) markets. It had faced local liquidity crises in 1994 and 2001 and a global economic crisis in 2008. The liquidity have been an influent factor for the returns (Demir et al., 2008; Atılgan et al., 2015) and prices (Ünlü, 2013). Probably because of its importance, Turkiye efforts to increase the market liquidity. The market announced BISTech what is a new trading platform in 2015 to accelerate the transactions and accepted "continuous trading" and "liquidity providing" rules to increase the liquidity. The figure 1 summarize the last 24 years for price, historical volatility (HIST VOL.), and relative volatility (REL VOL.) on the BIST.

Figure 1: Prices and Volatility of Borsa Istanbul for Last 24 Years



Source: www.yahoofinance.com

The market prices had been increased until to 2009. The first price decline happened on the 2009 for a short-time. The highest price rises happened between the years of 2009-2011 and 2017-2018. However, the prices crashed around end of the 2020 and the prices couldn't recover after that moment. In addition to price crash, historical volatility jumped from 33 to 500 at same period of the price crash. That volatility continues until to 2011. Those important events let this study to cover the time range with them. However, the time span is delimitated from the January of 2011 to the October of 2021 because of limitations.

The reason behind the selection of BIST100 is related with its coverage of blue chip stocks. Generally, the blue chip stocks are the most traded and demanded stocks in financial markets and they are the most interested stocks of the international investors (Hearn, 2010). The market indices which cover the blue chip stocks like as BIST100, S & P500, DAX30...etc. can impact whole market. They are leaders in a market and the market follows them. Thereby, risks, returns, and trends of a market can be forecasted just by following blue chip stocks (Annaert et al., 2011). Moreover, blue chip stocks and indices are the most likely met the CAPM assumptions (Hearn, 2010) which is the root of this study's methodology. The only criteria for the stock selection process in this study is being traded in BIST100 index between the years of 2011 and 2021. Thereby, the sample covers fifty-seven company stocks of that had continiusely involved in BIST100 index between the January of 2011 and the October of 2021. Not all stocks of the index are in the sample, since the fourty-three stocks hadn't consistently involved in the index during the research period. The Table-1 shows the sampled companies' stock codes and operation sectors.

Table 1: Sampled Stocks

Sector	Stock Code	Sector	Stock Code
Bank	AKBNK	Electricity, Gas and Water	ZOREN
	ALBRK		AKSEN
	GARAN	Real Estate Corporations	ALGYO
	ISCTR		EKGYO
	SKBNK		TRGYO
	HALKB		ISGYO
	TSKB	Food, Beverages and Tobacco	AEFES
	VAKBN		ULKER
	YKBNK	Mining	KOZAL
Chemistry, Pharmacy, Petrol, Plastic Products and Tires	AKSA		KOZAA
	GOODY		IPEKE
	GUBRF	Retail Trade	BIMAS
	PETKM		MGROS
	SASA	Communication	TCELL
	TUPRS		TTKOM
Holdings and Investment Companies	ECILC	Main Metal Industry	EREGL

	ECZYT		KRDMD
	GLYHO	Technology - Army	ASELS
	GSDHO	Wholesale Trade	DOAS
	SISE	Public Works and Construction	ENKAI
	TAVHL	Entrepreneur Capital Corporation	GOZDE
	TKFEN	Paper and Paper Products, Publishing and Distribution	KARTN
	ALARK	Technology - IT	NETAS
	DOHOL	Transportation and Storage	THYAO
	KCHOL	Metal Utilities, Machine, Electrical Tools, Transportation Vehicles	TTRAK
	SAHOL		
Metal Products, Machine, Electrical Tools, Vehicles	VESTL		
	OTKAR		
	TOASO		
	KARSN		
	FROTO		
	ARCLK		

Notes: The table is created by the author. The data were gathered from www.bist.com.tr

The stocks are from twelve different sectors. The sectors are (1) Bank, (2) Chemistry, pharmacy, petrol, and plastic products and tires, (3) Holdings and investment companies, (4) Metal products, machine, electrical tools, and vehicles, (5) Electricity, gas, and water, (6) Real estate corporations, (7) Food, beverages, and tobacco, (8) Mining, (9) Retail trade, (10) Communication, (11) Main metal industry, (12) Technology-army, wholesale trade, public works and construction, entrepreneur-capital corporation, paper and paper products, publishing and distribution, technology- IT, transportation and storage, and metal utilities, machine, electrical tools, and transportation vehicles.

2.2. Price Factors

The price factors were estimated with LWW6F. Lin et al. (2011) generated that model by adding liquidity factor to CAPM and FF5F asset pricing models. Fama and French (1993) defines the asset prices with term premium *(TERM)*, size factor *(SMB)*, and market-to-book value *(HML)*, while CAPM preferred to default premium *(DEF)* and market excess return *(MKT)*. It defines the prices as a function of excess return ($r_{it} - r_{ft}$). LWW6F incorporated those two asset pricing models and the liquidity factor *(L)* to them. The LWW6F model seen at the eq. (1).

$$r_{it} - r_{ft} = \alpha_i + \beta_{i,MKT} MKT_t + \beta_{i,SMB} SMB_t + \beta_{i,HML} HML_t + \beta_{i,DEF} DEF_t + \beta_{i,TERM} TERM_t + \beta_{i,L} L_t + \varepsilon_{it} \quad \text{(eq.1)}$$

In eq. (1), *MKT* is the market excess return. It shows the difference of market and stock returns. The market return is the average return of the BIST100 on monthly basis.The average stock returns were calculated for all twelve sectors in the sample. *DEF* is the default premium which compares the returns of the stocks and the long-term government bonds. *TERM* is the return difference of the long and short-term government bonds. The ten-year government bond rates were used for the long-term, while three-months government bond rates were used for the short-term government bond returns in this study. *SMB* is the excess returns of small stocks' over the big stocks and sorted the stocks by transaction volumes. In *SMB* calculation, the average transaction volume of the sample was taken by the months to sort the stocks as small or big. Then, each stock's transaction volume was compared with the sample's transaction volume. If the stock's transaction volume is less than the sample's, the stock is small. While, if a stock's transaction volume is equal or more than the sample's transaction volume, the stock was accepted as a big stock. *HML* classifies the stocks as high and low on basis of market-to-book values (MV/ BV). It is equal to high and low stocks' return differences. The low stocks' average *MV/BV* is less than the sample average *MV/BV* and the high stock's average *MV/BV* is higher than the sample average *MV/BV*. *L* is the liquidity ratio of the market. It was appraised with the Amihud illiquidity ratio (AIR).

r_{it} is the market return and r_{ft} is the risk-free rate. The Treasury bill (T-bill) rates were used for the r_{ft}. The Table 2 shows the variable definitions and data sources.

Table 2: Variables-Lin, Wang, and Wu (2011) Six Factors

Variable	Definition	Sources
MKT	Stock market excess return. It is differences of the stock and market returns.	www.bist.com/ datastore
SMB	Small stock return- big stock return. It is calculated by sorting the stock as big and small.	www.bist.com/ datastore
HML	High stock return- low stock return. It is calculated by sorting the stock as high and low.	www.bist.com/ datastore
DEF	Default premium. It is difference of the ten- year government bond and market returns.	www.evds2.tcmb.gov.tr www.bist.com/ datastore
TERM	Term premium. It is difference of the ten- year government bond and three- month government bond returns.	www.evds2.tcmb.gov.tr www.investing.com
L	Liquidity level of the market. The Amihud (2002) illiquidity ratio was used.	www.bist.com/ datastore
β	Beta (coefficients of the variables). Fama and MacBeth (1973) cross-sectional regression test was used to estimate the beta values of each variable.	www.evds2.tcmb.gov.tr www.investing.com www.bist.com/datastore
γ	Expected stock return coefficients. It is estimated with a regression test.	www.evds2.tcmb.gov.tr www.investing.com
r_{it}	Stock market return. It is average monthly return of the BIST 100.	www.bist.com/ datastore
r_{ft}	Risk- free rate. The Treasury bill (T-bill) rates were used.	www.evds2.tcmb.gov.tr

Notes: The table is created by the author. The variables are used to define Lin, Wang, and Wu (2011) six-factor model.

β values are the coefficients of the variables and they show sensitivities. βi_L is the liquidity sensitivity that is the most important β value because of this study's purpose. βi_L can be explained as the sensitivity of each sector return to creation in market liquidity (Lin et al., 2011).

The β values are also important for the expected return estimation. The eq. (2) represents to expected return regression model. γ values are the stocks' expected return coefficients.

$$r_{it} - r_{ft} = \gamma_0 + \gamma_1\beta_{iMKT} + \gamma_2\beta_{iSMB} + \gamma_3\beta_{iHML} + \gamma_4\beta_{iDEF} + \gamma_5\beta_{iTERM} + \gamma_6\beta_{iL} + \varepsilon_{it}$$

(eq.2)

γ_6 is the coefficient of the β_{IL} and it should be significantly positive if the liquidity level is important for the market prices (Lin et al., 2011).

2.3. Liquidity Factor

The Amihud (2002) illiquidity ratio was used for estimating the liquidity. The return and transaction volume are the two main variables of the illiquidity ratio. The daily return (R_{it}) and monthly illiquidity ratio ($ILLIQ_{im}$) are calculated as seen in eq. (3) and eq. (4), respectively.

$$R_{it} = 100x \frac{P_t - (P_{t-1})}{(P_{t-1})}$$

(eq.3)

$$ILLIQ_{im} = \frac{1}{D_{im}} \sum_{t=1}^{D_{iy}} \frac{|R_{imd}|}{VOL_{imd}}$$

(eq.4)

Where P_t is the stock price at day *t* and P_{t-1} is the price at day *t-1*, $|R_{imd}|$ is the absolute value of the cumulative daily returns. VOL_{imd} is the cumulative daily transaction volume and D_{im} is the actual trading days in a month. $ILLIQ_{im}$ is multiplied by 10^6 (Amihud, 2002). The Table 3 shows the variable definitions and data sources for the liquidity.

Table 3: Variables-Liquidity Factors

Variable	Definition	Source
P_t	Stock price in day t.	www.bist.com/ datastore
P_{t-1}	Stock price in day t-1.	www.bist.com/ datastore
VOL_{imd}	Transaction volume on monthly basis.	www.bist.com/ datastore
D_{imd}	Trading days in a month.	www.bist.com/ datastore
R_{it}	Daily returns of the market. It is equal to $\frac{P_t - P_{t-1}}{P_{t-1}}$ x 100	www.bist.com/ datastore
$\lvert R_{imd} \rvert$	Absolute value of monthly returns of the market.	www.bist.com/ datastore
$ILLIQ_{im}$	Amihud Illiquidity Ratio. Monthly illiquidity ratio of the market. It is equal to $\frac{1}{D_{im}} \sum_{t=1}^{D_{iy}} \frac{\lvert R_{imd} \rvert}{VOL_{imd}}$	www.bist.com/ datastore

Notes: The table is created by the author. The variables are used to define the Amihud Illiquidity Ratio model.

The daily data of the BIST100 index was used for the monthly illiquidity level of the market calculation. The index's daily price and transaction volume data were gathered from the www.bist.com/datastore. The market trading days was found by excluding holidays and weekends from the thirty-days for each month.

3. RESULTS and DISCUSSION

Table 4 shows the summary statistics and the correlation matrix for the six factors and excess returns used in the cross-sectional regression test. The observation number is 1560 for each factor and the all data were Winsorized to reduce the effect of the outliers during the analysis.

Table 4: Summary Statistics and Correlations of the Variables

Summary Statistics							
	MKT	***SMB***	***HML***	***L***	***TERM***	***DEF***	***ri-rf***
Mean	0.007	0.019	0.034	$0.016/10^4$	-0.001	0.012	0.002
Median	0.005	0.007	-0.005	$0.011/10^5$	-0.010	0.010	0.000
Std.Dev.	0.049	0.099	0.186	$0.014/10^5$	0.101	0.083	0.116
Min	-0.080	-0.168	-0.159	$0.001/10^5$	-0.200	-0.150	-0.220
Max	0.115	0.270	0.680	$0.049/10^5$	0.200	0.170	0.210
Obs.	1560	1560	1560	1560	1560	1560	1560
Correlations							
MKT	1.000						
SMB	0.481	1.000					
HML	-0.285	-0.236	1.000				
L	-0.028	0.008	-0.002	1.000			
TERM	-0.038	-0.189	0.103	0.003	1.000		
DEF	0.105	0.266	-0.148	0.005	-0.474	1.000	

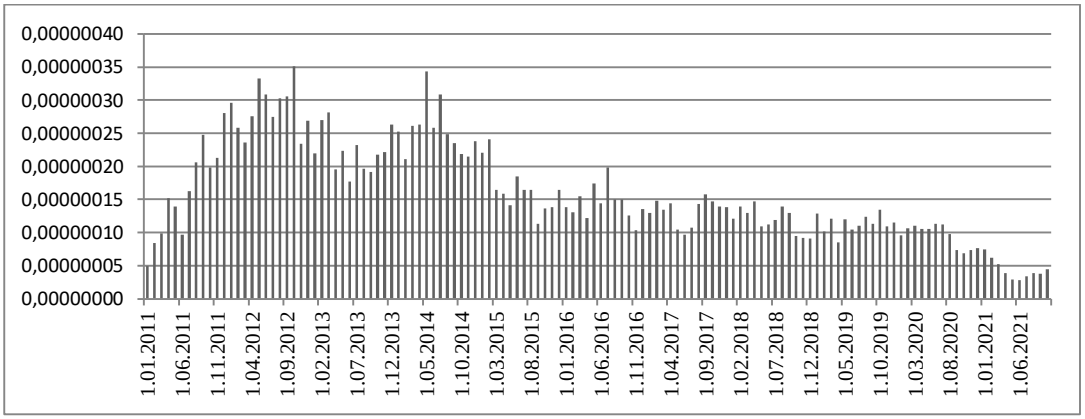
Notes: The correlations were tested under 95% significance level. MKT is the stock market excess return, SMB is the size factor, HML is the market-to-book value, L is the liquidity factor, TERM is the term premium, DEF is the default premium, ri-rf is excess return of the market.

The summary statistics show that the average r_i-r_f is 0.002 (0.2%) with a 0.116 (11.6%) standard deviation. The average r_i-r_f is relatively low. *MKT*, *SMB*, *HML*, and *DEF* have higher averages. A similar structure can be seen on the minimum values. r_i-r_f has the least minimum value (-0.220 or -22%). *HML* has the highest standard deviation, average, and maximum values. Although its average is 0.034 (0.34%) and its maximum value is 0.680 (68%), its standard deviation is 0.186 (18.6%). *TERM* has the least average value with -0.001 (-0.1%) and *L* has the least maximum value with $0.049/10^5$ (or

0.00000049). Further, *L* has the lowest standard deviation ($0.014/10^5$ or 0.00000014). According to those results, *HML* has more tendencies to show volatility and *L* is more stable than other factors.

There is no any multi-collinearity was found between the factors. The correlations are low. The highest correlation of the factors is 0.481 and it is between *MKT* and *SMB* factors. The fig. 2 shows the average monthly market-wide liquidity level over the period.

Figure 2: Average Monthly Liquidity Level



Source: The figure was generated by the author based on the Borsa Istanbul's data with Amihud (2002) illiquidity ratio.

According to the fig. 2, the average liquidity level ranges from 0.00000003 to 0.00000035. The highest liquidity level in the market was observed on the July of 2012 and the lowest liquidity was observed on the February of 2012. The average liquidity level of the market had shown volatility and it gradually had decreased in the time.

3.1. Cross-Sectional Regression Estimations

The Fama and Macbeth (1973) cross-sectional regression test was run to reveal the six factors' effects over the prices and to estimate β values. Two different processes were followed for the β estimations. At the first process which is accepted as a long-term, every twelve months were added to the previous months. In that way, eleven βs were estimated for each factor. The β estimations of the long-term are in Panel A of the Table 5. According to the test results, the market had been sensitive to all factors except *TERM*. The market's interest in *TERM* disappeared after 2019. The significance level of the β_{TERM1} had decreased between the years of 2011 and 2018. β_{TERM1} is significant in 2011 and between years of 2011-2012 and 2011-2013 (at 0.20% significance level), between 2011-2014 (at 0.10% significance level), and between 2011-2015, 2011-2016, 2011-2017, and 2011-2018 (at 0.02% significance level). $\beta_{MKT1,}\beta_{L1,}\beta_{HML1,}\beta_{SMB1,}$ and β_{DEF1} are significant throughout all periods, whereas the significance levels are not same. $\beta_{MKT1,}\beta_{L1,}\beta_{HML1,}\beta_{SMB1}$ (for all time ranges), and β_{DEF1} (for years of 2011, 2011-2012, and 2011-2014) are significant at 0.20% significance level. β_{DEF1} is significant at 0.10% between 2011-2013, 2011-2015, 2011-2016, 2011-2017, and 2011-2018, at 0.05% between the years of 2011-2019, and at 0.02% between 2011-2020 and 2011-2021.

From the perspective of liquidity, this study argues with Zhang and Lence (2022) and Carvalho et al. (2022) over the periods of liquidity's relationship with the prices. Zhang and Lence (2022) found that the effects of liquidity were more remarkable in sub-periods of 1994–2004 and 2005–2019 on the SHSE and SZSE and Carvalho et al. (2022) concluded that liquidity was priced between the July of 2000 and the June of 2018 on the stock markets of Brazil, Chile, Colombia, Mexico, and Peru. However, *L* impacted the prices from the January of 2011 to the October of 2021 on the BIST. Therefore, liquidity is priced on the BIST for all periods. Those dissimilarities between the emerging markets can be explained by Maharani and Narsa (2023)'s results which mentioned the importance of the characteristics of the markets over the relationships of liquidity and price. Moreover, integration levels of the markets with the global market can explain that difference by following Bekaert and Harvey (1997) and Batten and Vo (2014).

Table 5: Beta Estimations

	***Panel* A**									
Time Range	α_1	β_{TERM1}	β_{SMB1}	β_{HML1}	β_{L1}	β_{MKT1}	β_{DEF1}	**P**	**Num. of Obs.**	**Num. Of Period**
2011	0.000	-0.501	$0.119/10^3$	$0.105/10^3$	29.854	$-0.099/10^3$	-0.051	0.42	144	12
		*(-1.28)**	*(1.00)**	*(1.00)**	*(1.00)**	*(-1.00)**	*(-0.34)**			
2011→2012	-0.030	-0.144	$0.059/10^3$	$0.052/10^3$	14.927	$-0.050/10^3$	0.510	0.59	288	24
	*(-1.00)**	*(-0.54)**	*(1.00)**	*(1.00)**	*(1.00*)*	*(-1.00)**	*(1.01)**			
2011→2013	-0.020	-0.168	$0.039/10^3$	$0.034/10^3$	9.956	$-0.033/10^3$	0.521	0.24	432	36
	*(-1.00)**	*(-0.88)**	*(1.00)**	*(1.00)**	*(1.00)**	*(-1.00)**	*(1.53)***			
2011→2014	-0.015	-0.246	$0.029/10^3$	$0.026/10^3$	7.466	$-0.025/10^3$	0.384	0.15	576	48
	*(-1.00)**	*(-1.45)***	*(1.00)**	*(1.00)**	*(1.00)**	*(-1.00)**	*(1.30)**			
2011→2015	-0.186	-0.317	$0.002/10^2$	$0.020/10^3$	6.038	$-0.020/10^3$	0.349	0.02***	720	60
	*(-1.07)**	*(-2.17)*****	*(1.00)**	*(1.00)**	*(1.00)**	*(-1.00)**	*(1.46)***			
2011→2016	-0.155	-0.342	$0.019/10^3$	$0.017/10^3$	5.032	$-0.016/10^3$	0.340	0.00***	864	72
	*(-1.07)**	*(-2.54)*****	*(1.00)**	*(1.00)**	*(1.00*)*	*(-1.00)**	*(1.69)***			
2011→2017	-0.118	-0.300	$0.016/10^3$	$0.015/10^3$	4.313	$-0.014/10^3$	0.292	0.00***	1008	84
	*(-0.94)**	*(-2.47)*****	*(1.00)**	*(1.00*)*	*(1.00)**	*(-1.00)**	*(1.69)***			
2011→2018	-0.103	-0.297	$0.014/10^3$	$0.012/10^3$	3.864	$-0.001/10^2$	0.262	0.00***	1152	96
	*(-0.94)**	*(-2.72)*****	*(1.00)**	*(1.00)**	*(1.00)**	*(-1.00)**	*(1.65)***			
2011→2019	-0.092	-0.303	$0.012/10^3$	$0.011/10^3$	3.435	$-0.011/10^3$	0.299	0.00***	1296	108
	*(-0.94)**	*(-3.03)*	*(1.00)**	*(1.00)**	*(1.00)**	*(-1.00)**	*(2.08)****			
2011→2020	-0.083	-0.316	$0.011/10^3$	$0.098/10^4$	3.091	$-0.096/10^4$	0.327	0.00***	1440	120
	*(-0.94)**	*(-3.43)*	*(1.00)**	*(1.00)**	*(1.00)**	*(-1.00)**	*(2.50)*****			
2011→2021	-0.077	-0.303	$0.010/10^3$	$0.091/10^4$	2.876	$-0.090/10^4$	0.330	0.00***	1548	130
	*(-0.94)**	*(-3.53)*	*(1.00)**	*(1.00)**	*(1.00)**	*(-1.00)**	*(2.69)*****			

	***Panel* B**									
Time Range	α_2	β_{TERM2}	β_{SMB2}	β_{HML2}	β_{L2}	β_{MKT2}	β_{DEF2}	**P**	**Num. of Obs.**	**Num. of Period**
2011→2012	-0.030	-0.144	$0.059/10^3$	$0.052/10^3$	14.927	$-0.050/10^3$	0.510	0.59	288	24
	*(-1.00)**	*(-0.54)**	*(1.00)**	*(1.00)**	*(1.00)**	*(-1.00)**	*(1.01)**			
2012→2013	-0.030	-0.001	$0.001/10^{11}$	$0.002/10^{12}$	$-0.054/10^8$	$-0.004/10^{13}$	0.807	0.16	288	24
	*(-1.00)**	*(-0.001)**	*(1.11)**	*(0.60)**	*(-1.25)**	*(-0.88)**	*(1.62)***			
2013→2014	0.000	-0.349	$0.001/10^{11}$	$-0.003/10^{12}$	$0.030/10^6$	$-0.013/10^{12}$	0.259	0.31	288	24
	-	*(-1.61)***	*(0.42)**	*(-1.60)***	*(1.00)**	*(-0.86)**	*(0.43)**			
2014→2015	-0.434	-0.541	$-0.004/10^{11}$	$0.031/10^{12}$	$-0.013/10^7$	$0.003/10^{12}$	0.092	0.11	288	24
	*(-1.00)**	*(-2.41)*****	*(-1.15)**	*(0.82)**	*(-0.97)**	*(1.09)**	*(0.29)**			
2015→2016	-0.434	-0.535	$-0.004/10^{11}$	$0.041/10^{12}$	$-0.023/10^7$	$0.002/10^{12}$	0.253	0.01***	288	24
	*(-1.00)**	*(-2.46)*****	*(-1.06)**	*(1.07)**	*(-1.26)**	*(1.03)**	*(1.96)****			
2016→2017	0.050	-0.256	$0.007/10^{12}$	$0.001/10^{12}$	$-0.016/10^7$	$-0.039/10^{14}$	0.149	0.18	288	24
	*(-1.00)**	*(-1.16)**	*(1.37)***	*(0.26)**	*(-1.24)**	*(-0.27)**	*(1.76)***			
2017→2018	0.050	-0.160	$-0.002/10^{12}$	$0.002/10^{12}$	$-0.048/10^8$	$-0.004/10^{12}$	0.025	0.61	288	24
	*(-1.00)**	*(-0.95)**	*(-1.18)**	*(1.22)**	*(-0.97)**	*(-1.22)****	*(0.13)**			
2018→2019	0.000	-0.316	$-0.004/10^{12}$	$-0.003/10^{12}$	$-0.003/10^6$	0.000	0.319	0.03***	288	24
	-	*(-2.06)****	*(-1.18)**	*(-1.02)**	*(-0.87)**	*(0.37)**	*(1.39)***			
2019→2020	0.000	-0.378	$-0.009/10^{12}$	$-0.008/10^{12}$	$-0.052/10^7$	$0.006/10^{12}$	0.589	0.00***	288	24

	-	*(-2.64)*****	*(-1.27)**	*(-1.13)**	*(-0.87)**	*(1.91)****	*(3.84)*			
2020→2021	0.000	-0.298	-0.005/10^{12}	-0.008/10^{12}	-0.020/10^{7}	0.003/10^{12}	0.503	0.00***	252	21
	-	*(-2.39)*****	*(-0.91)**	*(-1.03)**	*(-0.38)**	*(0.94)**	*(3.18)*			

Notes: ****, ***, **, * shows the significance at 0.02 %, 0.05 %, 0.10 % and 0.2 % levels, respectively. In Panel A, the betas were estimated with the cumulative time periods. In Panel B, the betas were estimated with the twenty-four months.α is intercept, β_L is the liquidity factor beta, β_{MKT} is the stock market excess return factor beta, β_{TERM} is the term premium factor beta, β_{DEF} is the default premium factor beta, β_{SMB} is the size factor beta, and β_{HML} is the market-to-book value factor beta. The second rows of each column show t-test values.

At the second process which is named as the short-term, the months were grouped as twenty-four months. β_s were gathered for each twenty-four months from the years of 2011 to 2021 and ten β_s were estimated with that process. The β estimation results can be found in Panel B of Table 5. t-test values of α couldn't be estimated for the years 2013-2014, 2018-2019, 2019-2020, and 2020-2021 because of repeated values. Unlike the long-term results, β_{TERM2} is significant for the all-time ranges and β_{DEF2} is not significant between the years of 2019-2020 and 2020-2021. β_{L2} is significant for the all-time ranges at 0.20% level. β_{TERM2} is significant at 0.20% level (between the years of 2011-2012, 2012-2013, 2016-2017, and 2017-2018), at 0.10% level (between 2013 and 2014 years), at 0.05% level (between 2018 and 2019 years), and at 0.02% level (between the years of 2014-2015, 2015-2016, 2019-2020, and 2020-2021). β_{DEF2} is significant at 0.20% level (between the years of 2011-2012, 2013-2014, 2014-2015, and 2017-2018), at 0.10% level (between the years of 2012-2013, 2016-2017, and 2018-2019) and at 0.05% level (between 2015-2016 years). β_{HML2} is significant at 0.10% level between the years of 2013-2014 and significant at 0.20% level in the spare of the time range. β_{MKT2} is significant at 0.2% level on the 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2016-2017, 2018-2019, and 2020-2021, and at 0.05% level 2017-2018 and 2019-2020. β_{SMB2} is significant at 0.20% in all periods except in 2016-2017, while it is significant at 0.10% level in this period.

The results showed the market is sensitive to all six factors for every period of the long and the short-term until 2019. TERM is not significant in the long-term and DEF is not significant in the short-term from 2019 to 2021. *L*, *SMB*, *HML*, and *MKT* are significant for the prices in all periods of the short and long-term. Although Zhang and Lence (2022) mentioned that the liquidity and return relationship is more remarkable in sub-periods, our results showed that β_{L1} and β_{L2} are significant among the all periods at the significance levels. Kumar and Misra (2019) and An et al. (2020) mentioned that liquidity risk is important for emerging markets (Indian and Chinese markets). Our results confirmed that results by showing importance of the liquidity for the Turkish stock market. *L* is the most effective factor for the prices in the long-term while *SMB*, *HML*, and *MKT* values are around zero both in the short and long-term. L is priced on the BIST as Ünlü (2013) mentioned. The market liquidity positively impacts the prices on the BIST. In compare of the short and the long-term results, there are some differences in the effects of factors on the prices. The coefficients of the *L* are negative and around zero in the short-term but it is positive and higher than other factors in the long-term. Low liquidity may cause higher prices in the short-term. *DEF* is the most effective factor and the significance of *TERM* is higher in the short-term.

In addition to factors, the equation model is significant at 0.05% in all time ranges from 2015 to 2021 in the long term. Based on the long-term results of the eq. (1) can be rewritten as seven different models which are on the Table 6.

Table 6: Model Estimations for Long-Term

$$r_{it} - r_{ft} = (-0.186) + (-0.020/10^3)MKT_t + (0.002/10^2)SMB_t + (0.020/10^3)HML_t + (0.349)DEF_t + (-0.317)TERM_t + (6.038)L_t$$
Model 1

$$r_{it} - r_{ft} = (-0.155) + (-0.016/10^3)MKT_t + (0.019/10^3)SMB_t + (0.017/10^3)HML_t + (0.340)DEF_t + (-0.342)TERM_t + (5.032)L_t$$
Model 2

$$r_{it} - r_{ft} = (-0.118) + (-0.014/10^3)MKT_t + (0.016/10^3)SMB_t + (0.015/10^3)HML_t + (0.292)DEF_t + (-0.300)TERM_t + (4.313)L_t$$
Model 3

$$r_{it} - r_{ft} = (-0.103) + (-0.001/10^2)MKT_t + (0.014/10^3)SMB_t + (0.012/10^3)HML_t + (0.262)DEF_t + (-0.297)TERM_t + (3.864)L_t$$
Model 4

$$r_{it} - r_{ft} = (-0.092) + (-0.011/10^3)MKT_t + (0.012/10^3)SMB_t + (0.011/10^3)HML_t + (0.299)DEF_t + (-0.303)TERM_t + (3.435)L_t$$
Model 5

$$r_{it} - r_{ft} = (-0.083) + (-0.096/10^4)MKT_t + (0.011/10^3)SMB_t + (0.098/10^4)HML_t + (0.327)DEF_t + (-0.316)TERM_t + (3.091)L_t$$
Model 6

$$r_{it} - r_{ft} = (-0.077) + (-0.090/10^4)MKT_t + (0.010/10^3)SMB_t + (0.091/10^4)HML_t + (0.330)DEF_t + (-0.303)TERM_t + (2.876)L_t$$
Model 7

Notes:
1.The correlations were tested under 95% significance level. MKT is the stock market excess return, SMB is the size factor, HML is the market-to-book value, L is the liquidity factor, TERM is the term premium, DEF is the default premium, ri-rf is excess return of the market.
2. TERM is significant at 0.02% level, SMB, HML, MKT, L is significant at 0.2% level, and DEF is significant at 0.10% level in Model 1, Model 2, Model 3, and Model 4. TERM is not significant, SMB, HML, MKT, L is significant at 0.2% level. DEF is significant at 0.05% level in Model 5, Model 6, and Model 7.

The periods of the models are 2011-2015, 2011-2016, 2011-2017, 2011-2018, 2011-2019, 2011-2020, and 2011-2021 for models 1, 2 3, 4, 5, 6, and 7, respectively. β_{L1} has the biggest share of the r_i-r_f in the models. That verifies the influence of L. It is the most influential factor for the prices. The β_{L1} ranges between 2.876 and 6.038. The highest β_{L1} value was observed in Model 1 when the period is from 2011 to 2015. Although the market's sensitivity continued until 2021, it had a declining trend and reached 2.876 in 2011-2021 period. It shows the market's attention to the liquidity, stock prices are impacted by the liquidity, and prices of the stock have a positive relationship in the long-term. β_{MKT1} and β_{TERM1} are negative in the models. MKT and TERM have inverse relations with the prices. $\beta_{MKT1,}$ $\beta_{SMB1,}$ and β_{HML1} are around zero and β_{DEF1} is another important factor for the prices which range from 0.262 to 0.349. The market liquidity positively impacts the price in the long-term. In a comparison of the long-term and short-term results, the effects of factors on the prices are different. L factor is negative and around zero in the short-term. That low liquidity is eligible to cause higher price demands.

The equation model is significant at 0.05% level between years of the 2015-2016, 2018-2019, 2019-2020, and 2020-2021 for the short-term and four significant models were gathered which are named as Model 8, 9, 10, and 11, respectively. The models are represented at Table 7.

Table 7: Model Estimations for Short-Term

$$r_{it} - r_{ft} = (-0.434) + (0.002/10^{12})MKT_t + (-0.004/10^{11})SMB_t + (0.041/10^{12})HML_t + (0.253)DEF_t + (-0.535)TERM_t + (-0.023/10^7)L_t$$
Model 8

$$r_{it} - r_{ft} = (0.000) + (0.000)MKT_t + (-0.004/10^{12})SMB_t + (-0.003/10^{12})HML_t + (0.319)DEF_t + (-0.316)TERM_t + (-0.003/10^6)L_t$$
Model 9

$$r_{it} - r_{ft} = (0.000) + (0.006/10^{12})MKT_t + (-0.009/10^{12})SMB_t + (-0.008/10^{12})HML_t + (0.589)DEF_t + (-0.378)TERM_t + (-0.052/10^7)L_t$$
Model 10

$$r_{it} - r_{ft} = (0.000) + (0.003/10^{12})MKT_t + (-0.005/10^{12})SMB_t + (-0.008/10^{12})HML_t + (0.503)DEF_t + (-0.298)TERM_t + (-0.020/10^7)L_t$$
Model 11

Notes:
1.The correlations were tested under 95% significance level. MKT is the stock market excess return, SMB is the size factor, HML is the market-to-book value, L is the liquidity factor, TERM is the term premium, DEF is the default premium, ri-rf is excess return of the market.
2. TERM is significant at 0.02% level, SMB, HML, MKT, and L is significant at 0.2% level, and DEF is significant at 0.05% level in Model 8. TERM is significant at 0.05% level, SMB, HML, MKT, L is significant at 0.2% level, and DEF is significant at 0.1% level in Model 9. TERM is significant at 0.02% level, SMB, HML, and L is significant at 0.2% level, MKT is significant at 0.05% level and DEF is not significant in Model 10. TERM is significant at 0.02% level, SMB, HML, MKT, and L is significant at 0.2% level, and DEF is not significant in Model 11.

β_{DEF2} and β_{TERM2} are the most effective factors for the prices in the short-term. β_{HML2} (except in Model 8), $\beta_{SMB2,}$ $\beta_{L2,}$ and β_{TERM2} are negative in all models, while they have inverse effects on the prices. β_{L2} is around zero, while it ranges from -0.052/10^7 (or -0.0000000052) and -0.002/10^6 (or -0.000000002). The cross-sectional test demonstrated that liquidity is a significant factor in the prices. The market is sensitive to liquidity both in the long and short-term. However, liquidity characteristics are different in the short-term. Ma et al. (2020) deduced that pricing the liquidity is related to investor sensitivity to the

liquidity risk. The liquidity risk premium would be negative because of the sensitivity. The negative relationship between the liquidity and price on the BIST for the short-term may be explained by investor sensitivities. Possibly, the investors' reactions are different in the short and long term, so the relationship is negative instead of positive. The liquidity shocks may be another reason for that differences between the short and long-term results. Iwanaga and Hirose (2022) demonstrated the effects of the positive and negative shocks among the markets aren't similar. The shocks may cause positive or negative relationships between the liquidity and prices. Further, BIST needs time to price the liquidity positively.

3.2. Expected Stock Returns

The βs were used to estimate expected returns. The βs were named as β_1 in the long-term and as β_2 in the short-term models. A regression model represented at eq. (2) was run for the expected return estimations. The correlation and multi-collinearity can harm regression models' results. Therefore, correlation and multi-collinearity were tested for β_1 and β_2 values.

$$r_{it} - r_{ft} = \gamma_0 + \gamma_1 \beta_{iMKT} + \gamma_2 \beta_{iSMB} + \gamma_3 \beta_{iHML} + \gamma_4 \beta_{iDEF} + \gamma_5 \beta_{iTERM} + \gamma_6 \beta_{iL} + \varepsilon_{it} \quad \text{(eq.2)}$$

Table 8: Correlations of Beta Values

Panel A						
	β_{TERM1}	**β_{SMB1}**	**β_{HML1}**	**β_{L1}**	**β_{MKT1}**	**β_{DEF1}**
β_{TERM1}	1.000					
β_{SMB1}	0.315	1.000				
β_{HML1}	*-0.722	-0.662	1.000			
β_{L1}	-0.364	*-0.730	*0.715	1.000		
β_{MKT1}	0.668	0.502	*-0.787	-0.472	1.000	
β_{DEF1}	-0.575	-0.685	*0.912	0.652	*-0.780	1.000
Panel B						
	β_{TERM2}	**β_{SMB2}**	**β_{HML2}**	**β_{L2}**	**β_{MKT2}**	**β_{DEF2}**
β_{TERM2}	1.000					
β_{SMB2}	0.628	1.000				
β_{HML2}	-0.485	-0.625	1.000			
β_{L2}	0.045	-0.042	0.127	1.000		
β_{MKT2}	-0.508	0.010	-0.004	0.142	1.000	
β_{DEF2}	0.586	-0.005	0.219	-0.061	-0.608	1.000

Notes: * indicates high correlations between the variables. β_L is the liquidity factor beta, β_{MKT} is the stock market excess return factor beta, β_{TERM} is the term premium factor beta, β_{DEF} is the default premium factor beta, β_{SMB} is the size factor beta, and β_{HML} is the market-to-book value factor beta. β_1 values are β estimations for the long-term and β_2 values are for the short-term.

Table 8 shows correlations of the βs. The Panel A is for β_1 and Panel B is for β_2 values in the table. High correlations were detected between β_{TERM1} and β_{HML1}, β_{HML1} and β_{DEF1}, β_{SMB1} and β_{L1}, β_{DEF1} and β_{MKT1}, β_{HML1} and β_{L1}, and β_{HML1} and β_{MKT1}. The high correlations signal possible multi-collinearity problems between the βs. It was examined with the Variance Inflation Factor (VIF). A 10+ *VIF* value shows a multi-collinearity problem between the variables (Vittinghoff et al., 2012; Jou et al., 2014). The VIF test results concluded there is not a serious multi-collinearity problem (mean VIF is 5.26) but the VIF of β_{HML1} is 11.88. Therefore, β_{TERM1} was omitted from the model. Thus, the mean VIF dropped to 4.74 and the VIF of each factor is under 10. β_2 values don't have highly correlated factors and the mean VIF is 3.60 (see Appendix 1 and Appendix 2 for the VIF test results). The results of the expected return estimations are in Table 9. Three regressions were estimated for the returns.

Table 9: Expected Return Estimation

	γ_{HML1}	**γ_{DEF1}**	**γ_{MKT1}**	**γ_{TERM1}**	**γ_{SMB1}**	**γ_{L1}**	**p**	**R^2**	**Adj. R^2**
β_{1a}	-1.926 *(0.344)	0.092 *****(3.950)	-0.162 (-4.100)	Ж	0.906 **(1.760)	$0.472/10^6$ ****(2.69)	***0.01	0.900	0.810
	γ_{HML2}	**γ_{DEF2}**	**γ_{MKT2}**	**γ_{TERM2}**	**γ_{SMB2}**	**γ_{L2}**	**p**	**R^2**	**Adj. R^2**

β_{2a}	-0.790 ** (-1.550)	0.008 * (0.270)	-0.052 *(-1.010)	0.015 *(-0.470)	0.119 * (0.240)	$-0.032/10^{6}$ * (-0.61)	0.45	0.720	0.160
	γ_{HML3}	γ_{DEF3}	γ_{MKT3}	γ_{TERM3}	γ_{SMB3}	γ_{L3}	**p**	**R^2**	**Adj. R^2**
β_{2b}	-0.633 *****(-2.910)	ж	-0.039 **(-1.430)	ж	ж	$-0.042/10^{-6}$ *(-1.230)	***0.050	0.700	0.540

Notes: ж shows omitted factors, *****, ****, ***, **, * shows the significance at 0.01%, 0.02%, 0.05%, 0.10% and 0.2% levels, respectively. The t-test values are represented in the parentheses on the second rows. γ_{HML} is the market-to-book factor coefficient, γ_{DEF} is the default premium factor coefficient, γ_{MKT} is the stock market excess return coefficient, γ_{L} is the liquidity factor coefficient, γ_{SMB} is the size factor coefficient, γ_{TERM} is the term premium factor coefficient.

The first rows of Table 9 are γ values which show each variable's coefficient for the expected return and the second rows are the t-values of the γ_s. β_{1a} is the estimation model for the long-term. β_{2a} and β_{2b} are the estimation models for the short-term.

β_{1a} estimation is significant at 0.05% level ($p \leq 0.05$) where R^2 is 0.90. γ_{MKT1} is not significant at any levels, it doesn't impact the excess returns. γ_{HML1} is the only inverse-effect factor (significant at 0.2% level). A 1% rise (decrease) in *HML* causes a 1.926% decline (rise) in the excess returns. The significance levels are 0.01%, 0.02%, and 0.05% for γ_{DEF1}, γ_{L1}, and γ_{SMB1}, respectively. Atılgan et al. (2015) concluded that the effect of *HML* is not accurate but market liquidity is the most important factor for the returns on the BIST. However, *HML* is significant for all three models and liquidity isn't the most effective factor for the returns. In comparison with *DEF* and *L*, *SMB* has a stronger effect on the returns in the long-term. A 1% rise in *SMB* increases the excess returns by 0.906%. *DEF* has a positive effect, as well. It can trigger the return rise by 0.092%. γ_{L1} is another positive factor, if *L* increases by 1% the expected excess returns will increase by $0.472/10^{6}$ (or 0.000000472%), as well. The positive impact of the *L* for the returns is in line with Demir et al. (2008) conclusions.

As mentioned before, there are two models were estimated for the short-term. The reason of behind those two estimations is related to the model's significance. Even though there is no high correlation and multi-collinearity problems between β_2 values, the regression model is not significant ($p=0.45 > 0.05$) for the short-term. Therefore, the model was tested by omitting some factors in the model. After testing fourty-nine possible regression models, the β_{2b} model was selected that is significant at 0.05% level ($p \leq 0.05$). β_{DEF2}, β_{TERM2}, and β_{SMB2} were eliminated in the model (see Appendix 2 for the VIF test result). *HML*, *MKT*, and *L* have negative effects over the excess returns and γ_{HML3}, γ_{MKT3}, and γ_{L3} are significant at 0.01%, 0.05%, and 0.2% levels, respectively. Like in the long-term, the effect of the liquidity is weak in the short-term. A 1% increase (decrease) in γ_{L3} results in a $0.047/10^{6}$ (or 0.000000042%) decline (increase) in the returns. *MKT*'s effect is around zero, as well. The return would decrease (increase) by 0.039% if γ_{MKT3} increases (decreases) by 1%. γ_{HML3} has a higher effect than the two other factors of β_{2b}. A 1% increase (decrease) in γ_{HML3} causes a 0.633% decline (increase) in the return.

Unlike Quirós et al. (2017) and Musneh et al. (2020)'s conclusions, we found that liquidity impacts expected returns in the market. Chordia et al. (2001), Chang et al. (2009), Hubers (2012), Foran et al. (2014), Vu et al. (2014), Bradrania et al. (2015), Zhang and Ding (2018), Kim and Na (2018) and Marozva (2019) mentioned an inverse relationship of the returns and liquidity for developed markets but maybe the relationship is valid for emerging markets, too. This study's short-term result confirmed that the liquidity negatively impacts the expected returns on the BIST. As an emerging market, BIST acts like a developed market in the short-term and shows an inverse relationship. The results underline Narayan and Zheng (2011)'s and Shih and Su (2016)'s results regarding the inverse relationship between liquidity and return, as well. However, all of those results argue with the long-term results because the relationship isn't inverse.

Chen et al. (2023) demonstrated illiquidity can forecast the stock returns at least for one-year horizon besides causing a return premium. The result of this study confirms that. According to the results, the liquidity is important for the returns but that importance changes its character in time. γ_{L1} has

a positive and γ_{L3} has a negative relationship with the expected excess returns. A 1% rise in γ_{L1} increases expected excess returns by $0.472/10^6$ (or 0.000000472%) while a 1% rise (decrease) in γ_{L3} declines (increase) the returns by $0.042/10^6$ (or 0.000000042%).

β_L and γ_L values should be positive if the liquidity is important for a market (Lin et al., 2011). The β_L and γ_L values (β_{L1} and γ_{L1}) are significant and positive. Therefore, the results show that liquidity is an important factor for the prices and expected returns on the BIST in the long-term. On the other hand, those β_{L2} and γ_{L2} *are* significant and negative. The liquidity is not important for the short-term. It can be said that market doesn't interest in the liquidity and the other factors are more important than the liquidity in the short-term. The market's interest in liquidity increases in thr long-term. The liquidity became the most important factor for the prices and it is able to forecast excess returns of a market.

3.3. Robustness Tests

As a different approach, Abdi and Ranaldo (2017)'s spread measure (AR spread) was used for the market liquidity in the robustness check. The AR spread defines the liquidity as a function of costs while it is a ratio of return to trade volume in AIR method. The liquidity is the daily spread of the stocks in AR spread. Close, high, and low prices of stocks are necessary in liquidity calculation (Le & Gregoriou, 2020).

The same test processes were followed for beta estimations from section 3.1. Table 10 shows the β_s estimations both for the short and long-terms. The long-term β_s estimations are in panel A and short-term β_s estimations are in panel B of Table 10.

Table 10: Beta Estimations with AR Spread

	***Panel* A**									
Time Range	α_1	β_{TERM1}	β_{SMB1}	β_{HML1}	β_{LAR1}	β_{MKT1}	β_{DEF1}	**P**	**Num. of Obs.**	**Num. of Per.**
2011	0.000	-0.501	$0.037/10^2$	$0.032/10^2$	$0.574/10^2$	$-0.018/10^2$	-0.051	0.415	144	12
	-	(-1.280)*	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(-0.340)*			
2011→2012	-0.030	-0.144	$0.018/10^2$	$0.016/10^2$	$0.287/10^2$	$-0.009/10^2$	0.510	0.593	288	24
	(-1.000)*	(-0.540)*	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(1.010)*			
2011→2013	-0.020	-0.167	$0.012/10^2$	$0.011/10^2$	$0.191/10^2$	$-0.006/10^2$	0.521	100.241	432	36
	(-1.000)*	(-0.880)*	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(1.530)**			
2011→2014	-0.015	-0.246	$0.009/10^2$	$0.008/10^2$	$0.144/10^2$	$-0.004/10^2$	0.384	0.153	576	48
	(-1.000)*	(-1.450)**	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(1.300)*			
2011→2015	-0.186	-0.317	$0.007/10^2$	$0.006/10^2$	$0.115/10^2$	$-0.004/10^2$	0.349	0.020***	720	60
	(-1.070)*	(-2.170)***	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(1.460)**			
2011→2016	-0.155	-0.342	$0.006/10^2$	$0.005/10^2$	$0.096/10^2$	$-0.003/10^2$	0.340	0.003***	864	72
	(-1.070)*	(-2.540)****	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(1.690)**			
2011→2017	-0.118	-0.300	$0.005/10^2$	$0.005/10^2$	0.008/10	$-0.003/10^2$	0.292	0.004***	1008	84
	(-0.940)*	(-2.470)****	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(1.690)**			
2011→2018	-0.103	-0.297	$0.005/10^2$	$0.004/10^2$	0.0007/10	$-0.002/10^2$	0.262	0.002***	1152	96
	(-0.940)*	(-2.720)****	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(1.650)**			
2011→2019	-0.092	-0.303	$0.004/10^2$	$0.004/10^2$	$0.064/10^2$	$-0.002/10^2$	0.299	0.000***	1296	108
	(-0.940)*	(-3.030)	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(2.080)***			
2011→2020	-0.083	-0.316	$0.004/10^2$	$0.003/10^2$	0.006/10	$-0.002/10^2$	0.327	0.000***	1440	120
	(-0.940)*	(-3.430)	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(2.500)****			
2011→2021	-0.077	-0.303	$0.003/10^2$	$0.003/10^2$	0.0005	$-0.002/10^2$	0.330	0.000***	1548	130
	(-0.940)*	(-3.530)	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(2.690)****			
	***Panel* B**									

Time Range	α_2	β_{TERM2}	β_{SMB2}	β_{HML2}	β_{LAR2}	β_{MKT2}	β_{DEF2}	p	Num. of Obs.	Num. of P
2011→2012	-0.030	-0.144	0.002/10	0.002/10	0.029/10	-0.0009	0.510	0.593	288	24
	(-1.000)*	(-0.540)*	(1.000)*	(1.000)*	(1.000)*	(-1.000)*	(1.010)*			
2012→2013	-0.030	-0.001	0.000	0.000	0.000	$0.121/10^{14}$	0.807	0.307	288	24
	(-1.000)*	(-0.001)*	(0.500)*	(-1.180)*	(0.880)*	(0.760)*	(1.620)**			
2013→2014	0.000	-0.349	0.007/10	-0.078/10	0.003/10	-0.0042	0.259	0.179	288	24
	-	(-1.610)**	(0.720)*	(-1.54)**	(1.52)**	(-0.020)*	(0.820)*			
2014→2015	-0.434	-0.541	$0.018/10^{13}$	$-0.184/10^{14}$	$0.396/10^{13}$	$-0.398/10^{14}$	0.092	0.036***	288	24
	(-1.000)*	(-2.410)****	(0.520)*	(-0.890)*	(1.840)***	(-0.790)*	(0.290)*			
2015→2016	-0.434	-0.535	0.005/10	$-0.436/10^{14}$	$0.197/10^{14}$	$-0.634/10^{14}$	0.253	0.001***	288	24
	(-1.000)*	(-2.460)****	(0.000)*	(-1.44)**	(0.84)*	(-1.340)*	(1.960)***			
2016→2017	0.050	-0.256	$0.357/10^{14}$	$-0.478/10^{15}$	$-0.013/10^{12}$	$-0.123/10^{14}$	0.149	0.071**	288	24
	(1.00)*	(-1.160)*	(1.310)*	(-0.280)*	(-1.05)*	(-0.92)*	(1.760)**			
2017→2018	0.050	-0.160	$0.368/10^{13}$	$0.188/10^{13}$	$0.142/10^{11}$	$-0.291/10^{13}$	0.025	0.827	288	24
	(1.000)*	(-0.950)*	(0.970)*	(0.990)*	(0.92)*	(-1.020)*	(0.130)*			
2018→2019	0.000	-0.316	$-0.321/10^{14}$	$-0.497/10^{13}$	$0.118/10^{13}$	$-0.047/10^{14}$	0.319	0.019***	288	24
	-	(-2.060)***	(-0.41)*	(-0.970)*	(0.520)*	(-0.420)*	(1.390)**			
2019→2020	0.000	-0.378	$-0.822/10^{14}$	$-0.001/10^{11}$	$0.305/10^{13}$	$0.183/10^{14}$	0.589	0.000***	288	24
	-	(-2.640)****	(-0.860)*	(-1.050)*	(0.710)*	(0.670)*	(3.840)			
2020→2021	-0.013	-0.298	$-0.112/10^{13}$	$-0.103/10^{13}$	$0.146/10^{13}$	$0.224/10^{14}$	0.503	0.000***	252	21
	(-0.320)*	(-2.390)****	(-1.030)*	(-0.940)*	(0.290)*	(0.810)*	(3.180)			

Notes: ****, ***, **, * shows the significance at 0.02 %, 0.05 %, 0.10 % and 0.2 % levels, respectively. In Panel A, the betas were estimated with the cumulative time periods. In Panel B, the betas were estimated with the twenty-four months.α is intercept, $\beta_{LAR}$is the liquidity factor beta, β_{MKT} is the stock market excess return factor beta, β_{TERM} is the term premium factor beta, β_{DEF} is the default premium factor beta, β_{SMB} is the size factor beta, and β_{HML} is the market-to-book value factor beta. The second rows of each column show t-test values.

The results on panel A of Table 10 show the models are significant from 2011-2015 to 2020-2021($p \leq 0.05$). $\beta_{SMB1,}\beta_{HML1,}\beta_{LAR1}$, and β_{MKT} are significant at 0.20% level among all periods. Similarly, β_{DEF1} is significant among all periods but its significance levels range from 0.20% to 0.02%. The least effective factor is $\beta_{TERM,}$ while it was significant in the 2011-2018 period and its effect disappeared after 2018. It didn't impact the prices afterward. The panel B shows the models are significant ($p \leq 0.05$) in 2014-2015, 2015-2016, 2016-2017, 2018-2019, 2019-2020, and 2020-2021 periods. β_{SMB2} and β_{MKT2} are significant at 0.20% level and $\beta_{HML2,}\beta_{LAR2}$, and β_{TERM2} are significant at different levels among the all periods. β_{DEF2} is significant in all periods from 2011 to 2019. Those results confirm the previous test results that the AIR liquidity measure was used.

4. CONCLUSIONS

This study examines the role of market liquidity in stock prices and returns. Thereby, a six-factor model was adopted for the stock prices and expected returns were estimated by regression models for the Borsa Istanbul for approximately ten years. The factors are *market excess return (MKT), size factor (SMB), book-to-market value (HML), liquidity factor (L), term premium (TERM),* and *default premium (DEF).* The research sample is fifty-seven stocks that had been traded in the BIST100 index from January 2011 to October 2021. The dataset has 1560 Winsorized monthly observations for each factor.

The analysis shows that the average excess return of BIST was 0.002 (0.02%) for the period. The *book-to-market value* was the most volatile and *liquidity* was the most stable factor. The maximum liquidity level was 0.000049% which happened on July of 2012. Two different processes were followed for sensitivity estimations of the factors. The first was named as long-term which every twelve months were added to the previous months.

The six-factor model was significant in the 2011-2015, 2011-2016, 2011-2017, 2011-2018, 2011-2019, 2011-2020, and 2011-2021 periods. The market is sensitive to *the market excess return, size factor, book-to-market value, liquidity,* and *default premium* factors except *term premium* in the long-term test. The market's interest in *term premium* disappeared after the 2011-2018 period. The *term premium* is significant in 2011 and between the years of 2011-2012 and 2011-2013 (at 0.20% significance level), between 2011-2014 (at 0.10% significance level), and between 2011-2015, 2011-2016, 2011-2017, and 2011-2018 (at 0.02% significance level) in the long-term. The *market excess return, size factor, book-to-market value, default premium,* and *liquidity* are significant throughout all periods, whereas the significance levels are not same. The *market excess return, liquidity, book-to-market value, size factor* (for all time ranges), and *default premium* (for the 2011, 2011-2012, and 2011-2014 periods) are significant at 0.20% significance level. The *default premium* is significant at 0.10% between 2011-2013, 2011-2015, 2011-2016, 2011-2017, and 2011-2018, at 0.05% between the years of 2011-2019, and at 0.02% between 2011-2020 and 2011-2021. The *liquidity* is the most effective factor for the prices in the long-term. The *size factor, book-to-market value,* and *market excess return* are around zero in the short and long-term.

The second process was named as the short-term where the dataset was grouped as twenty-four months. The research model is significant in the 2015-2016, 2018-2019, 2019-2020, and 2020-2021 periods of the short-term test. The *book-to-market value* is significant at 0.10% level in the 2013-2014 period and significant at 0.20% level in the spare of the periods. Similarly, the *size factor* is significant at 0.10% level in the 2016-2017 period and at 0.20% level in the spare of the periods. The *market excess return* and *term premium* have inverse relationships with the prices. The *term premium* is significant at 0.20% level in the 2011-2012, 2012-2013, 2016-2017, and 2017-2018 periods, at 0.10% level in the 2013-2014 period, at 0.05% level in the 2018-2019 period, and at 0.02% level in the 2014-2015, 2015-2016, 2019- 2020, and 2020-2021 periods. The *market excess return* is significant at 0.2% level in the 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2016-2017, 2018-2019, and 2020-2021 periods, and at 0.05% level in the 2017-2018 and 2019- 2020 periods. The *default premium* is significant at 0.20% level in the 2011-2012, 2013-2014, 2014-2015, and 2017-2018 periods, at 0.10% level in the 2012-2013, 2016-2017, and 2018-2019 periods and at 0.05% level in the 2015-2016 period. As like to the long-term results, the *liquidity* is significant for the all periods at 0.20% level, but it is negative in the short-term test. According to those results, the liquidity is important in the short-term as far as in the long-term. However, the market doesn't price the liquidity in the short term. That implies the sensitivity to the liquidity is not enough to price the liquidity in the short-term while it is the most influential factor of the prices for the long-term. There is a possibility the investors' reactions are different in the short and long term, so the relationship is inverse instead of positive. The strongest impact of the liquidity was observed in the 2011-2015 period and the weakest impact was observed in the 2011-2021 period. That implies that liquidity had lost its power over the prices meanwhile the ten years. The *default premium* is the most effective factor and the significance of the *term premium* is higher in the short-term. The *size factor, liquidity,* and *term premium* have inverse effects on the prices.

The *market excess return* is not significant at any level, it doesn't impact the excess returns in the long-term. The *book-to-market value* is the only inverse-effect factor (significant at 0.2% level). A 1% rise (decrease) in *book-to-market value* causes a1.926% decline (rise) in the long-term excess returns. The significance levels are 0.01%, 0.02%, and 0.05% for the *default premium, liquidity,* and *size factor,* respectively. In a comparison of *default premium* and *liquidity,* the *size factor* has a stronger effect on the returns in the long-term. A 1% rise in *size factor* increases the excess returns by 0.906%. The *default premium* can raise the return by 0.092% and *liquidity* increases by 1% the expected excess returns will increase by $0.472/10^6$ (or 0.000000472%), as well.

The return would decrease (increase) by 0.039% if the *market excess return* increases (decreases) by 1%. The *book-to-market value* has a higher effect than the two other factors. A 1% increase (decrease) in the *book-to-market value* causes a 0.633% decline (increase) in the return. The *book-to-market value* (γ_{HML3}), *market excess return* (γ_{MKT3}), and *liquidity* (γ_{L3}) are negatively significant at 0.01%, 0.05%, and 0.2% levels, respectively, for the expected excess returns in the short-term test. A 1% rise in *liquidity* would decrease the returns by 0.000000042%. Despite the importance of the liquidity in the long-term, the *liquidity* is not the most important factor both for the market prices and expected

excess returns in the short-term. The market's interest increases over the time. The liquidity needs a long-time to be priced. That result supports the idea about the unstable character of the liquidity-return relationship. However, those results demonstrate that estimating the effects of liquidity on the market for a short time cannot explain the relationship for all periods. Moreover, they argue the conclusions of the previous studies mention that liquidity and returns have either inverse or no relationship in emerging markets or sub-periods are qualified to understand the liquidity-market relationship.

This study's short-term result confirmed that the liquidity negatively impacts the expected returns on the BIST. As an emerging market, BIST acts like a developed market in the short-term and shows an inverse relationship. Based on the results, liquidity is important for the returns but that importance changes its character in time. The relationship between the liquidity and excess return is positive in the long-term and negative in the short-term. A 1% rise in liquidity increases expected excess returns by $0.472/10^6$ (or 0.000000472%) in the long-term while it declines (increase) the returns by $0.042/10^6$ (or 0.000000042%) in the short-term. Therefore, the results show that liquidity is an important factor for the prices and expected returns on the BIST in the long-term. On the other hand, liquidity isn't important in the short-term. It can be said, the market doesn't interest in liquidity and the other factors are more important than the liquidity in the short-term. The market's interest in liquidity increases in the long-term. The liquidity became the most important factor for the prices and it has an ability to forecast excess returns of a market.

The robustness tests showed similar estimations for the market sensitivity to the factors and demonstrated LWW6F can explain stock market prices, as well. That is another contribution of this study. LWW6F may be an alternative of existing pricing models for the stock markets.

The results explain how stock prices and expected returns will change with market liquidity level on the BIST. Thereby, the expected stock prices and returns can be estimated by appraising to market liquidity. Investors and other market participants can use this information in investment decisions, risk management, portfolio selection, and wealth management. It is also important for companies to decide their stock prices and fulfill investors' excess return expectations. Moreover, a market and/or companies can use the liquidity to attract international investors because it shows the advantages of investing on the BIST. The investors seek new investment opportunities in the domestic and global markets. Since high return is an attractive factor for investors, the markets can trigger investments by changing the market liquidity level. Especially, international investors may be interested in that because previous studies showed some markets' prices aren't affected by liquidity risk. It means those kinds of markets will be so attractive in risky periods. The policymakers can shape the markets with those results within liquidity management. Therefore, the results are important for the financial markets, investors, policymakers, and researchers.

Limitations: Despite this study's remarkable outputs, it has some limitations. Different systematics can be used for the beta estimations. Due to there is not a solid process for that, another approach can be used. This study can be replicated by expanding the time period and sample, as well.

Future Research: The results are important for the next studies because they ask new questions about liquidity. The first question is about the relation type. As mentioned before, the relation is positive for the long-term whereas it is inverse for the short-term. There is no obvious reason for that result. The other question may be about the validity of the LWW6F for the other emerging and developed markets. However, that model is valid for BIST, previous studies mentioned some factors like development level or micro and macro-economic conditions can impact the liquidity-market relation.

Ethics Statement: *In this study, no method requiring the permission of the "Ethics Committee" was used. In case of detection of a contrary situation, AKAD Journal has no responsibility and all responsibility belongs to the author(s) of the study.*
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Çıkar Beyanı*: Yazarlar arasında çıkar çatışması yoktur.*

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APPENDICES

Appendix 1-VIF Test Results

	β_1		β_2	
Variable	**VIF**	**1/VIF**	**VIF**	**1/VIF**
HML	11.88	0.08	3.04	0.33
TERM	2.79	0.36	7.96	0.13
SMB	2.62	0.38	3.04	0.33
L	2.87	0.35	1.28	0.78
DEF	8.21	0.12	4.31	0.23
MKT	3.16	0.32	2.00	0.50
Mean VIF	5.26		3.60	

Appendix 2 -VIF Test Results After Eliminations

	β_1			β_2	
Variable	**VIF**	**1/VIF**	**Variable**	**VIF**	**1/VIF**
HML	8.06	0.13	**HML**	1.02	0.98
MKT	2.88	0.35	**MKT**	1.02	0.98
DEF	7.41	0.14	**L**	1.04	0.96
SMB	2.56	0.39			
L	2.79	0.36			
Mean VIF	4.74		**Mean VIF**	1.03	