ASSET LIQUIDITY, STOCK LIQUIDITY, AND OWNERSHIP CONCENTRATION: EVIDENCE FROM THE ASE

Ghada Tayem*, Mohammad Tayeh**, Adel Bino**

* Corresponding author: Department of Finance, School of Business, The University of Jordan, Amman 11942, Jordan. Tel. +96265355000.
Email address: g.tayem@ju.edu.jo
** Department of Finance, School of Business, The University of Jordan, Amman 11942, Jordan.

Abstract

This paper examines how ownership concentration influences the relation between stock liquidity and asset liquidity. Liquid assets reduce uncertainty of assets in place and hence improve stock liquidity. However, liquid assets are less costly to turn into private benefits compared to other assets. Therefore, liquid assets may result in increasing the uncertainty of assets in place rather than reducing it. In this paper we examine the impact of asset liquidity on stock liquidity conditional on a company's ownership structure using the context of Jordan. Jordanian companies listed in the ASE are mostly characterized by highly concentrated ownership. In the absence of investor protection, concentrated ownership allows shareholders with large ownership stakes to exercise control over the firm and hence may result in increasing the uncertainty of assets in place. The uncertainty regarding the usage of liquid assets in cash-rich firms leads to greater uncertainty regarding the firm's cash flows and hence lower stock liquidity. The findings of this study show evidence that as ownership concentration increases asset liquidity becomes negatively related to stock liquidity.

Keywords: Stock Liquidity; Asset Liquidity; Ownership Concentration; Largest Shareholders; Jordan
JEL classification: G14; G31; G32

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1. INTRODUCTION

This paper examines the relation between asset liquidity and stock liquidity using a sample of firms listed on the Amman Stock Exchange (ASE). Specifically, it examines if the liquidity of a firm's assets carries to the liquidity of the financial claims on those assets. Liquid assets reduce the uncertainty of assets in place and hence improve stock liquidity (Gopalan et al., 2012). However, the extant literature assumes that the interests of the firm's agents are aligned and therefore a firm determines its liquid assets such that the value of the firm, through improvements in its stock liquidity, is maximized (Gopalan et al., 2012). In this study, we relax this assumption by looking at how ownership concentration affects the relationship between asset and stock liquidity. Specifically, we argue that excess liquid assets increase the scope of large shareholders' discretion and hence may result in increasing the uncertainty of assets in place rather than reducing it. Therefore, we expect that the sensitivity of stock liquidity to asset liquidity is negative for companies with concentrated ownership. To the best of our knowledge this is the first study to examine whether and how ownership concentration influences the relationship between asset and stock liquidity.

The literature on the impact of a firm's investment choices on stock liquidity is only recent with a small number of papers examining this issue (Gopalan et al., 2012; Chen et al., 2013; and Charoenwong et al., 2014). Gopalan et al. (2012) formalize a theoretical model that shows how managerial investment decisions can affect stock liquidity by converting liquid assets into illiquid ones. The authors hypothesize that more cash lowers valuation uncertainty associated with assets in place, and therefore more cash improves stock liquidity. This is consistent with the argument that liquid assets, such as cash and its equivalents, are subject to less information asymmetry and hence are easier to value than other assets such as fixed assets and growth options (Kothari et al., 2002 and Aboody and Lev, 2000). Therefore, firms with higher level of asset liquidity are expected to have lower valuation uncertainty and hence higher stock liquidity. Gopalan et al. (2012) find that for a panel data of all

Compustat firms during the time period 1962-2005 and after controlling for determinants of stock liquidity, there is a positive and significant relationship between the alternative measures of asset liquidity and those of stock liquidity. Charoenwong et al. (2014) report international evidence in 47 countries that supports the finding in Gopalan et al. (2012) of a positive impact of asset liquidity on stock liquidity. In addition, Chen et al. (2013) use the methodology in Faulkender and Wang (2006) to study the variation of the value of corporate liquid assets with that in stock liquidity. They find that excess returns are positively related to cash holdings and that the value of liquid assets increases for illiquid firms.

However, this study proposes that asset liquidity affects stock liquidity negatively when a firm's ownership structure is taken into account. Free cash flows increase managers', and by extension large-controlling shareholders', power due to the existence of more resources under their control (Jensen, 1986). In addition, it is less costly to turn liquid assets into private benefits compared to other assets (Myers and Rajan, 1998). Therefore, and in the absence of investor protection, large shareholders have incentives to appropriate cash holdings. The greater uncertainty over the usage and redeployment of cash and liquid assets entails greater uncertainty over the firm's future cash flows (Charoenwong et al., 2014). Traders anticipate this uncertainty of cash-rich firms controlled by large shareholders and therefore trade their stocks at a premium.

The direction of the relation between asset liquidity and stock liquidity, therefore, can be resolved empirically. In this paper, we examine this relation empirically using a sample of Jordanian nonfinancial firms listed in the ASE during the period 2001-2012. The dependent variable in our analysis is stock (ill) liquidity. To test our proposition, we employ different alternative measures of stock illiquidity and another measure of stock liquidity. The measures of stock illiquidity are: the implicit bid-ask spread proposed by Roll (1984) as estimated by Hasbrouck (2009); the proportion of zero trading days proposed by Lesmond et al. (1999); and the illiquidity measure proposed by Amihud (2002). Moreover, we employ the turnover ratio which is a measure of stock liquidity (Brennan et al., 1998; Datar et al., 1998; Chordia et al., 2001; and Avramov and Chordia, 2006). We follow Gopalan et al.'s (2012) methodology to construct the asset liquidity measures and we modify these measures to take into account short-term debt. Finally, we employ a set of control variables based on the empirical work on the determinants of the liquidity of individual assets (Demsetz, 1968; Tinic, 1972; Branch and Freed, 1977; Stoll, 1978; and Easley et al., 1987).

The main independent variable of interest in this paper is asset liquidity. The measurement of asset liquidity for the purposes of this study's empirical analysis follows closely the approach discussed in Gopalan et al. (2012). In order to construct the asset liquidity measures we rank a firm's assets based on their degree of liquidity and assign to each asset class a liquidity score between zero and one. Then, for each firm we compute a weighted average of the liquidity scores across the different asset classes. The weights are based on the proportion of each asset class scaled by the lagged value of total assets. As we will explain in details in the methodology section, we define three alternative measures of asset liquidity by varying the liquidity scores assigned to each asset class in the initial step. In addition, we propose another measure of asset liquidity based on the idea that investors take into account net cash position, cash minus short-term liabilities, when they assign a value to the firm's stock.

In our analysis, we control for variables that have been documented to affect stock liquidity in the literature. We include firm fixed effects to control for unobservable firm characteristics that affect stock liquidity. To test if our results are robust to controlling for endogeneity, we employ System Generalized Method of Moments (System-GMM) estimator proposed by Arellano and Bond (1991). Our initial findings show inconsistent evidence of a positive relation between asset liquidity and stock liquidity in the ASE. However, we obtain more consistent results when we introduce the interaction term between asset liquidity measures with the ownership concentration measure. The results show, in about half of our specifications, that asset liquidity measures are negatively and significantly related to illiquidity measures and positively and significantly related to the liquidity measure. These results indicate that asset liquidity is positively related to stock liquidity. The results also show that the interaction term is positively related to stock illiquidity measures and negatively related to the stock liquidity measure indicating that liquid assets in companies with (without) large shareholders reduce (enhance) stock liquidity. This result indicates that investors believe that excess cash in companies with large shareholders increase the scope of large shareholders' discretion which leads to greater uncertainty about future assets and hence lower stock liquidity. Therefore the sensitivity of stock liquidity to asset liquidity is negative for companies with high concentrated ownership.

Stock liquidity is an important field of study as liquidity is in itself a reduction in the cost of trading and an indicator of the degree of stock market development (Demirgüç-Kunt and Levine, 1996). In addition, the extant evidence shows that an increase in stock liquidity increases firm value by reducing its cost of equity (Amihud and Mendelson, 1986). However, there is little evidence on the impact of corporate investment decisions on the liquidity of stocks and virtually no evidence from the ASE. This research aims to fill this gap by studying whether and how the composition of firm assets of companies listed on the ASE influence their stock liquidity. Therefore, this study extends the US evidence presented in Gopalan et al. (2012) and the international evidence presented in Charoenwong et al. (2014). More importantly, this study contributes to the extant literature by providing the first evidence on the influence of ownership structure on the relationship between stock and asset liquidity. We find that in firms with large shareholders the sensitivity of stock liquidity to asset liquidity is negative. Overall, our findings indicate that ownership structure is an important determinant of the asset-stock liquidity relation.

The rest of the paper is organized as follows. The next section presents the literature related to the measurement of stock liquidity and asset liquidity. Section 3 presents the research model and data is described in Section 4. Results and analysis are discussed in Section 5 and the conclusion is presented in Section 6.

2. VARIABLE MEASUREMENT

2.1. Liquidity Measurement and Determinants

The literature suggests several variables that capture the stock liquidity. These variables are explained next.

2.1.1. Bid-Ask Spread

The bid-ask spread is the most popular measure of liquidity and is widely used to measure liquidity in the market microstructure literature (e.g. Amihud and Mendelson, 1986; Chordia et al., 2000; and Venkataraman, 2001 among others). Moreover, the bid-ask spread reflects three cost components: order processing costs, inventory costs, and information asymmetry costs. However, it is deemed a noisy measure, because large trades have a tendency to happen outside the spread and small trades have a tendency to happen inside the spread (Brennan and Subrahmanyam, 1996). According to the data availability, we calculate this measure and construct individual firm spread using daily data. This measure is computed in two stages. First we calculated a firm-specific quoted bid-ask spread and a proportional quoted spread, which is the quoted bid-ask spread divided by the midpoint of the quote for stock *i* in day *t* as follows:

$$qspr_{it} = ask_{it} - bid_{it} \quad (1)$$

$$pqspr_{it} = \sum_{i}^{j} (ask_{it} - bid_{it})/((ask_{it} + bid_{it})/2) \quad (2)$$

where, ask_{it} is the ask price for $stock_i$ at day_t, bid_{it} is the bid price for $stock_i$ at day *t*. Then, the average individual stock's quoted spread and proportional quoted spread is computed each year to construct a yearly liquidity series. The yearly liquidity series of quoted spread and proportional quoted spread is computed as follows:

$$QSPR_{it} = \left(1/N_i\right)\sum_{i}^{j}(ask_{it} - bid_{it}) \quad (3)$$

$$PQSPR_{it} = \left(1/N_i\right)\sum_{i}^{j}(ask_{it} - bid_{it})/((ask_{it}) + bid_{it}/2) \quad (4)$$

where, N_i is the number of trading days in a given year of stock *i*.

2.1.2. Zero Proportion of Trading Days

Lesmond et al. (1999) suggest a stock illiquidity measure derived from daily stock returns. Stock illiquidity measure called the Zero Proportion, is the proportion of trading days with zero returns for $stock_i$ during a year to the total trading days in a given year:

$$Zero_i = \frac{Trading\ Days\ with\ Zero\ Returns_i}{Total\ Trading\ Days} \quad (5)$$

2.1.3. Price Impact

The price impact (known as Kyle's lambda) is utilized as a proxy for liquidity in order to capture the depth dimension of liquidity which is the mean of the market's ability to absorb and execute large orders with a low price impact. We measure the price impact through illiquidity ratio, which is defined as the ratio of daily absolute stock returns over the trading value as proposed by Amihud's (2002). It can be interpreted as the daily price response associated with one dollar of trading volume, which is the opposite of the liquidity ratio that is used in the market microstructure literature (such as Cooper et al., 1985; Berkman and Eleswarapu, 1998). The main feature of this measure over other different measures of liquidity is that it requires just daily data to be computed and can be utilized to construct a series that could span a long time period. This measure is first calculated for each stock in the sample, that is, the price impact for stock *i* at day *t* is given as follows:

$$pimpact_{it} = \left|R_{it}\right|/TValue_{it} \quad (6)$$

where, R_{it} is the return for stock *i* at day *t* and $TValue_{it}$ is the trading value for stock *i* at day *t*. Then, the average of the individual stocks' price impact is computed each day to construct a yearly liquidity series as follows:

$$PIMPACT_{it} = \left(1/N_i\right)\sum_{i}^{j} pimpact_{it} \quad (7)$$

where, N_i is the number of trading days in a given year of stock *i*.

2.1.4. Trading Activity

Trading activity measures are widely accepted among researchers (see Brennan et al., 1998; Datar et al., 1998; Chordia et al., 2001; Avramov and Chordia, 2006 among others) because they are highly associated with the bid-ask spread and other measures of liquidity. We define the turnover ratio as the product of the division between the trading value and the market capitalization. Using daily data on this measure we construct an individual firm turnover ratio by computing the average individual stocks' turnover ratio as follows:

$$TOV_{it} = \left(1/N_i\right)\sum_{i}^{j} TValue_{it}/MV_{it} \quad (8)$$

where, $TValue_{it}$ is the trading value for stock *i* at day *t*, MV_{it} is the market capitalization for stock *i* at day *t*, and N_i is the number of trading days of stock *i*.

2.2. Asset Liquidity Measurement

The major independent variable in our study is asset liquidity. We follow Gopalan et al.'s (2012) methodology to construct asset liquidity measures. For a given firm, we rank its asset classes based on their degree of liquidity and assign a liquidity score between zero and one to each of them. Second, we calculate a weighted average of the liquidity scores across the different asset classes for each firm. The weights are based on the proportion of each asset class scaled by the lagged value of total assets. Depending on the liquidity scores assigned to each asset class in the first step, this methodology yields three alternative measures of weighted asset liquidity (*WAL*) score for each firm, explained next.

2.2.1. WAL1

The *WAL*1 measure is crude and assumes that assets other than cash have no liquidity. We then calculate *WAL*1 as follows:

$$WAL1_{it} = \frac{Cash\ \&\ Equivalents_{it}}{Total\ Assets_{it-1}} \times 1 + \frac{Other\ Assets_{it}}{Total\ Assets_{it-1}} \times 0 \quad (9)$$

In addition, we modify $WAL1_{i,t}$ into two ways as follows:

$$WAL1A_{it} = \frac{Cash\ \&\ Equivalents_{it} - Bank\ Debt_{it}}{Total\ Assets_{it-1}} \times 1 + \frac{Other\ Assets_{it}}{Total\ Assets_{it-1}} \times 0 \quad (10)$$

$$WAL1B_{it} = \frac{Cash\ \&\ Equivalents_{it} - Short\ Term\ Debt_{it}}{Total\ Assets_{it-1}} \times 1 + \frac{Other\ Assets_{it}}{Total\ Assets_{it-1}} \times 0 \quad (11)$$

where, bank debt and loans refer to short term maturity bank debt and short term maturity loans. This modification takes into account the practice among Jordanian firms to borrow in the short run as a mean of cash management. Firms subject to sudden cash shortages borrow from banks using credit lines or delay payment to their suppliers. This practice in essence turns short-term debt into negative cash.

2.2.1. WAL2

We assign a liquidity score of one to cash and cash equivalents and 0.5 to non-cash current assets because non-cash current assets are the second most liquid assets after cash. All other assets are assigned a score of zero. We calculate *WAL*2 as follows:

$$WAL2_{it} = \frac{Cash\ \&\ Equivalents_{it}}{Total\ Assets_{it-1}} \times 1 + \frac{Non\ Cash\ CA_{it}}{Total\ Assets_{it-1}} \times 0.5 + \frac{Other\ Assets_{it}}{Total\ Assets_{it-1}} \times 0 \quad (12)$$

2.2.3. WAL3

The third weighted asset liquidity *WAL*3 measure looks further into long-lived assets. Long-lived assets can be classified into tangible and non-tangible assets. We assign a liquidity score of one to cash and cash equivalents, 0.75 to non-cash current assets, 0.5 to tangible fixed assets, and zero to non-tangible assets. We then compute *WAL*3 as follows:

$$WAL3_{it} = \frac{Cash\ \&\ Equivalents_{it}}{Total\ Assets_{it-1}} \times 1 + \frac{Non\text{-}Cash\ CA_{it}}{Total\ Assets_{it-1}} \times 0.75 + \frac{Tangible\ Fixed\ Assets_{it}}{Total\ Assets_{it-1}} \times 0.5 + \frac{Other\ Assets_{it}}{Total\ Assets_{it-1}} \times 0 \quad (13)$$

3. STUDY METHODOLOGY

The aim of this study is to examine the relation between asset liquidity and stock liquidity using a sample of Jordanian firms. In addition, we condition the relation between asset liquidity and stock liquidity on the level of ownership concentration. To examine these relations we empirically test the following equation:

$$(IL)LIQ_{jit} = \lambda WAL_{kit} + \gamma \mathrm{Largest}_{it} + \theta \mathrm{Largest}_{it} \times WAL_{kit} + \sum_{m}^{1} \delta_j \mathrm{X}_{mit} + \nu_i + u_{it} \quad (14)$$

where, $(IL)LIQ_{jit}$ are our measures of illiquidity/liquidity which include: the quoted spread, proportional spread, proportion of zero trading days, price impact and finally turnover ratio; WAL_{kit} are our measures of asset liquidity; $\mathrm{Largest}_{it}$ represent the sum of the percentage ownership of the largest three shareholders owning 5% and more; $\mathrm{Largest}_{it} \times WAL_{kit}$ is our main variable of interest that represents the interaction between ownership concentration and the measures of asset liquidity; X_{mit} is a vector of control variables that includes the firm's size, MTB ratio, firm's profitability and price inverse. Following Stoll (2000) and Charoenwong et al. (2014) we include the following control variables. We include MV, defined as the log of total market capitalization, to control for the firm's size effect. We include market to book ratio (MTB) to control for growth opportunities. In addition, we include return on assets to control for the firm's operating performance. We also include the inverse of the stock price to control for the discrete tick size effect. The Operational definitions of the variables discussed so far are presented in Table 1.

Equation 14 is estimated using two alternative models: fixed (within) effects and System-GMM. The fixed effect (within) model deals with unobservable firm-specific effects ν_i, which, change across firms but is fixed for a given firm through time (Wooldridge, 2002). However, asset liquidity and stock liquidity are likely to be endogenous as firms with growth opportunities may have high asset liquidity and stock liquidity (Gopalan et al., 2012). Failing to control for this source of endogeneity will lead to biased estimators. To deal with this issue we employ the System Generalized Method of Moments (GMM) estimator proposed by Arellano and Bond

(1991). This procedure uses lagged values to instrument for asset liquidity and estimates the regression using the GMM procedure.

Table 1. Summary of Variable Definitions

Variables	***Proxy***
Quoted Spread	The differences between ask price and bid price.
Proportional Spread	The quoted bid-ask spread divided by the midpoint of the quote.
Zero	The proportion of trading days with zero returns to total trading days in a given year.
Price Impact	The impact of order flows on prices calculated as a ratio of absolute return to trading value.
Turnover Ratio	Turnover measure of trading activities, which is calculated by dividing trading value over the market capitalization.
WAL1	A measure of asset liquidity that assigns a liquidity score of one to cash and cash equivalents multiplied by a weight equal to the proportion of cash and cash equivalents scaled by the lagged value of total assets.
WAL1A	A measure based on *WAL*1 but that deducts short term bank debt from cash.
WAL1B	A measure based on *WAL*1 but that deducts short term debt from cash.
WAL2	A measure of asset liquidity that assigns a liquidity score of one to cash and cash equivalents and 0.5 to non-cash current assets and zero score to all other assets. Each score is multiplied by a weight computed as the proportion of each asset class scaled by the lagged value of total assets.
WAL3	A measure of asset liquidity that assigns a liquidity score of one to cash and cash equivalents, 0.75 to non-cash current assets, 0.5 to tangible fixed assets, and zero to non-tangible assets. Each score is multiplied by a weight computed as the proportion of each asset class scaled by the lagged value of total assets.
Largest	The percentage of shares held by the largest three owners who hold 5% or more of outstanding shares.
Size	The logarithm of total market capitalization (*MV*).
MTB	Market to book value ratio (MTB) defined as book value of total assets minus book value of equity plus market value of equity divided by book value of assets.
Profitability	Earnings before interest and tax (EBIT) divided by total assets.
Price Inverse	The inverse of the closing price.

4. DATA DESCRIPTION

This paper uses a sample of non-financial Jordanian companies that are publicly traded on the Amman Stock Exchange (ASE) over the period 2002-2012. The data is collected from three sources. Data on stock trading are obtained from the ASE's Trading Files and data on financial items are obtained from the ASE's Company Guides. Trading Files compile market and trading related data and is published by the ASE at the end of each trading day. The Company Guide compiles financial data items obtained from financial statements of firms listed in the ASE and is published by the ASE at the end of each fiscal year. Data on ownership is collected manually from the Corporate Guides for the period 2002-2007 and from the firm's annual reports thereafter. It is mandated that listed firms on the ASE disclose the names of owners with a stock holding equal or above 5%, the numbers of declared shares and the corresponding percentage of ownership for each owner. The trading, financial and ownership data are matched using the firm's identifier. The next table presents some descriptive statistics of the key variables in the study.

Table 2. Summary Statistics

Table 2 reports descriptive statistics for a sample of nonfinancial Jordanian firms listed in the ASE over the period 2002-2012. Trading data is collected from the Trading Files issued by the ASE. Financial data is collected from the Corporate Guides issued by the ASE. Ownership data is collected from the Corporate Guides for the period 2002-2007 and from the financial statements of listed companies thereafter.

Variables	Mean	Median	SD	Min	Max	Skewness	Kurtosis
Quoted Spread	0.365	0.181	0.467	0.017	3.370	2.847	13.826
Proportional Spread	0.248	0.141	0.267	0.013	1.295	1.542	4.813
Zero	0.403	0.382	0.215	0.080	0.843	0.267	1.930
Price Impact	0.000088	0.000041	0.000142	0.0000013	0.001238	4.387	28.092
Turnover Ratio	0.001	0.000	0.002	0.000	0.013	3.535	17.864
WAL1	0.062	0.028	0.096	0.000	0.587	3.035	13.691
WAL1A	0.010	0.008	0.145	-0.543	0.587	0.297	7.174
WAL1B	-0.100	-0.087	0.196	-0.837	0.509	-0.270	4.393
WAL2	0.262	0.253	0.147	0.013	0.770	0.662	3.377
WAL3	0.575	0.581	0.165	0.067	1.099	-0.424	3.776
Largest	53.566	53.00	18.475	7.9	98.38	0.106	2.684
Size	16.419	16.331	1.266	12.972	22.011	0.435	4.426
MTB	1.367	1.230	0.558	0.481	3.782	1.333	5.262
Profitability	0.040	0.040	0.071	-0.309	0.360	-0.096	7.119
Price Inverse	0.661	0.500	0.566	0.023	4.000	2.703	12.974

Table 3. Correlation Matrix

Table 3 shows the correlation between the variables used in the study. The sample consists of nonfinancial Jordanian firms listed in the ASE over the period 2001-2012. Variable definitions are presented in Table 1. [a], [b], and [c] indicate significance at the 1%, 5%, and 10% respectively.

	QSpread	PSpread	Zero	Price Impact	Turnover Ratio	WAL1	WAL1A	WAL1B	WAL2	WAL3	Largest	Size	MTB	Profitability	Price Inverse
QSpread	1														
PSpread	0.767[a]	1													
Zero	0.424[a]	0.450[a]	1												
P. Impact	0.148[a]	0.361[a]	0.350[a]	1											
Turnover	-0.12[b]	-0.028	-.338[a]	-0.16[a]	1										
WAL1	0.242[a]	0.066	0.104[b]	-0.017	-0.024	1									
WAL1A	0.197[a]	0.079[c]	0.124[b]	0.007	-0.060	0.791[a]	1								
WAL1B	0.091[c]	0.009	0.032	0.030	-0.038	0.378[a]	0.510[a]	1							
WAL2	0.184[a]	0.109[b]	0.007	-0.007	0.026	0.650[a]	0.366[a]	0.073	1						
WAL3	0.092[b]	0.064	0.018	-0.021	-0.040	0.434[a]	0.200[a]	0.002	0.845[a]	1					
Largest	0.068	-0.16[a]	-0.027	-0.18[a]	-0.361[a]	0.098[b]	0.107[b]	0.158[a]	-0.108[b]	-0.060	1				
Size	0.596[a]	0.420[a]	0.238[a]	0.053	-0.185[a]	0.251[a]	0.161[a]	0.098[b]	0.179[a]	0.168[a]	0.455[a]	1			
MTB	0.202[a]	-0.026	0.120[b]	-0.14[a]	-0.262[a]	0.264[a]	0.207[a]	0.058	0.202[a]	0.167[a]	0.365[a]	0.334[a]	1		
Profit.	-0.30[a]	-0.14[a]	-0.20[a]	0.062	0.273[a]	-0.18[a]	-0.120[b]	-0.055	-0.19[a]	-0.14[a]	-0.364[a]	-0.38[a]	-0.48[a]	1	
P.Inverse	0.043	0.151[a]	0.213[a]	0.098[b]	-0.202[a]	0.070	0.107[b]	-0.019	0.067	0.082[c]	0.127[b]	0.160[a]	0.101[b]	-0.14[a]	1

Table 4. Fixed Effects Model

*Table 4 reports estimation results of the stock liquidity model using firm fixed effects. The sample consists of nonfinancial Jordanian firms listed in the ASE over the period 2001-2012. Variable definitions are presented in Table 1. t-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% respectively.*

	Quoted Spread	Proportional Spread	Zero	Price Impact	Turnover	Quoted Spread	Proportional Spread	Zero	Price Impact	Turnover
WAL1	-0.0423** (-2.04)	-0.0538** (-2.24)	0.0116** (2.47)	-0.0961*** (-3.46)	-0.0226 (-0.80)	- -	- -	- -	- -	- -
WAL1A	- -	- -	- -	- -	- -	0.116 (0.55)	0.386 (1.59)	0.0796 (1.62)	-0.587** (-2.00)	-0.153 (-0.52)
Largest	0.00929** (2.17)	0.00327 (0.66)	0.0057*** (5.81)	0.0257*** (4.42)	-0.0396*** (-6.70)	0.00956** (2.26)	0.00312 (0.64)	0.00557*** (5.74)	0.0256*** (4.41)	-0.0388*** (-6.67)
MV	0.234*** (2.68)	-0.0825 (-0.82)	-0.0402** (-2.04)	0.0595 (0.51)	-0.394*** (-3.32)	0.211** (2.43)	-0.0727 (-0.73)	-0.0396** (-2.02)	0.0388 (0.33)	-0.385*** (-3.27)
MTB	0.703*** (5.94)	0.733*** (5.36)	0.0816*** (3.04)	0.25 (1.56)	-0.236 (-1.46)	0.746*** (6.33)	0.747*** (5.53)	0.0838*** (3.15)	0.25 (1.58)	-0.253 (-1.58)
Profitability	-1.125* (-1.89)	-2.454*** (-3.57)	-0.123 (-1.00)	-0.672 (-0.92)	0.131 (0.18)	-1.481** (-2.59)	-2.815*** (-4.29)	-0.104 (-0.89)	-1.179* (-1.68)	0.0798 (0.11)
Price Inverse	-0.479*** (-4.64)	-0.223* (-1.87)	0.0284** (2.01)	0.459*** (5.50)	-0.481*** (-5.68)	-0.426*** (-4.28)	-0.210* (-1.84)	0.0277** (1.99)	0.464*** (5.57)	-0.488*** (-5.83)
Observations R^2	448 0.3844	448 0.1695	489 0.1122	489 0.1484	489 0.2157	440 0.3713	440 0.1681	481 0.1031	481 0.1361	481 0.2132
Table 4. Continued										
WAL2	-0.0217 (-0.32)	-0.1 (-1.30)	0.018 (1.18)	-0.251*** (-2.78)	-0.00461 (-0.05)	- -	- -	- -	- -	- -
WAL3	- -	- -	- -	- -	- -	-0.0343 (-0.37)	-0.0585 (-0.55)	0.0342 (1.60)	-0.300** (-2.36)	-0.0997 (-0.78)
Largest	0.00953** (2.25)	0.00298 (0.61)	0.00559*** (5.75)	0.0255*** (4.42)	-0.0389*** (-6.67)	0.00946** (2.23)	0.00289 (0.59)	0.00567*** (5.83)	0.0247*** (4.27)	-0.0391*** (-6.71)
MV	0.207** (2.39)	-0.086 (-0.86)	-0.0402** (-2.05)	0.0366 (0.32)	-0.382*** (-3.25)	0.204** (2.33)	-0.0882 (-0.88)	-0.0370* (-1.88)	0.0139 (0.12)	-0.394*** (-3.32)
MTB	0.747*** (6.31)	0.759*** (5.58)	0.0783*** (2.93)	0.311* (1.96)	-0.247 (-1.54)	0.750*** (6.29)	0.751*** (5.47)	0.0746*** (2.77)	0.328** (2.05)	-0.228 (-1.41)
Profitability	-1.461** (-2.54)	-2.718*** (-4.11)	-0.124 (-1.04)	-0.857 (-1.21)	0.0744 (0.10)	-1.468** (-2.56)	-2.794*** (-4.24)	-0.121 (-1.02)	-1.026 (-1.46)	0.134 (0.19)
Price Inverse	-0.433*** (-4.30)	-0.239** (-2.07)	0.0286** (2.03)	0.445*** (5.35)	-0.486*** (-5.78)	-0.434*** (-4.31)	-0.226* (-1.96)	0.0293** (2.09)	0.448*** (5.37)	-0.493*** (-5.86)
Observations R^2	448 0.3709	448 0.1661	489 0.1002	489 0.1443	489 0.2126	448 0.371	448 0.1627	489 0.1029	489 0.1396	489 0.2139

5. RESULTS AND ANALYSIS

To begin our empirical analysis we test whether on average there is a positive or a negative relation between asset liquidity and stock liquidity by estimating a fixed effects model as specified in equation 1. In order to account for the impact of other variables we estimate the relation between asset liquidity and stock liquidity including a set of control variables. We don't report the estimation results using the variable *WAL*1*B* to save space, however, the results are qualitatively similar to ones using *WAL*1*A*. We employ the 20 different combinations of asset liquidity and stock liquidity measures. Since four measures of stock liquidity, namely quoted spread, proportional spread, zero ratio and price impact, are in fact measures of stock illiquidity the sign of the relation between asset liquidity and stock liquidity is opposite to the sign of the coefficient. However, the turnover ratio is a measure of stock liquidity and hence the sign of the relation between asset and stock liquidity is similar to the sign of the coefficient. We report the results of the base model in Table 4 (See page 55).

Each column in Table 4 reports the estimation result using an alternative measure of (ill) liquidity. Each five columns in Table 4 report the estimation results for a different measure of asset liquidity: *WAL*1; *WAL*1*A*; *WAL*2; and *WAL*3. The results of the model estimates using the variable *WAL*1*B* are not reported to save space, however, they are qualitatively similar to the results using *WAL*1*A*. In case the dependent variable is *Quoted Spread*, *Proportional Spread* and *Price Impact*, the sign of the coefficients of asset liquidity measures reported in Table 4 are negative (with two exceptions). However, they are positive in case the dependent variable is *Zero*. On the other hand, in case the dependent variable is *Turnover* the sign of the coefficients of asset liquidity measures are negative. The signs of the coefficients of stock liquidity when using *Quoted Spread*, *Proportional Spread* and *Price Impact* as the dependent variable indicate that asset liquidity is positively related to stock liquidity. However, the signs of the coefficients of stock liquidity when using *Zero* and *Turnover* indicate asset liquidity is negatively related to stock liquidity. The only specifications where the coefficients of asset liquidity measures are consistently significant are when the dependent variable is *Price Impact*. However, the coefficients of asset liquidity measures are significant when using *Quoted Spread*, *Proportional Spread* in one specification, using *WAL*1, and when using *Zero* in one specification, when using *WAL*1. The coefficients on the asset liquidity measures are insignificant in case of using *Turnover* in all specifications.

Overall, the results reported in Table 4 are mixed. These mixed results call for further examination as they indicate that two effects may coexist due to the influence of another variable on the asset-stock liquidity relation. One particular variable of interest that can influence the asset stock liquidity relation is the firm's ownership structure. More liquid assets imply more discretion for agents controlling the firm which leads to greater uncertainty about future assets and hence lower stock liquidity. Therefore, the average relation between asset liquidity and stock liquidity may be subject to the influence of a firm's ownership structure. In order to examine the possible influence of a firm's ownership structure on the asset stock liquidity relation, we include an interaction term between the firm's ownership concentration, approximated by the ownership of the largest three shareholders, and its stock liquidity measure. We report the results of the modified model in Table 5.

The estimations reported in Table 5 reveal some interesting results. First, the sign of the coefficients of asset liquidity measures are negative (with little exceptions) in specifications using illiquidity measures as their independent variable and positive in specifications using the liquidity measure. These results indicate that on average asset liquidity is positively related to stock liquidity. Second, the average positive impact of asset liquidity on stock liquidity is reversed when considering the firm's ownership structure. The interaction term between *Largest* and each of the asset liquidity measures, carry a positive sign (with little exceptions) in specifications using illiquidity measures as their independent variable and a negative sign in specifications using the liquidity measure. Specifications where the coefficients of the interaction term are consistently significant are when the dependent variable is *Price Impact*. The coefficients of asset liquidity measures are significant when using *Zero* in one specification, and when using *Turnover* in another specification. These results show evidence that although the average impact of asset liquidity on stock liquidity is positive; the impact becomes negative in firms with large ownership concentration.

To deal with the endogeneity between asset liquidity and stock liquidity we employ the System Generalized Method of Moments estimator proposed by Arellano and Bond (1991). This procedure uses lagged values to instrument for asset liquidity and estimates the regression using the GMM procedure. We report the results in Table 6. The results are similar to the ones reported in Table 5. The sign of the coefficients of asset liquidity measures are negative (with little exceptions) in specifications using illiquidity measures as their independent variable and positive in specifications using the liquidity measure, which indicates that on average asset liquidity is positively related to stock liquidity. In addition, the interaction term between *Largest* and each of the asset liquidity measures is positive (with little exceptions) in specifications using illiquidity measures as their independent variable and negative in specifications using the liquidity measure. The coefficients of the interaction term are mostly significant when using *Turnover*, and more often than not significant when using *Quoted Spread*, *Proportional Spread*, and *Price Impact*. However, the coefficients of asset liquidity measures are significant when using *Zero* in one specification. These results supports the notion that the average impact of asset liquidity on stock liquidity is positive, however, the impact becomes negative in firms with large ownership concentration.

Table 5. Stock Liquidity and Asset Liquidity Conditional on Ownership Concentration: Firm Fixed Effects

*Table 5 reports estimation results of the stock liquidity model including an interaction term between Largest and each of the asset liquidity measures. The sample consists of nonfinancial Jordanian firms listed in the ASE over the period 2001-2012. Variable definitions are presented in Table 1. t-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% respectively.*

	Quoted Spread	***Proportional Spread***	***Zero***	***Price Impact***	***Turnover***	***Quoted Spread***	***Proportional Spread***	***Zero***	***Price Impact***	***Turnover***
WAL1	-0.0612 (-1.22)	-0.104* (-1.80)	-0.0091 (-0.80)	-0.324*** (-4.84)	0.150** (2.18)	- -	- -	- -	- -	- -
WAL1*Largest	0.0004 (0.41)	0.0011 (0.96)	0.0004** (1.99)	0.0049*** (3.72)	-0.0037*** (-2.75)	- -	- -	- -	- -	- -
WAL1A	- -	- -	- -	- -	- -	-0.384 (-0.52)	-0.37 (-0.44)	0.0502 (0.30)	-2.165** (-2.20)	0.969 (0.98)
WAL1A*Largest	- -	- -	- -	- -	- -	0.0094 (0.70)	0.0142 (0.93)	0.0006 (0.19)	0.0300* (1.68)	-0.0213 (-1.19)
Largest	0.0112* (1.78)	0.0083 (1.15)	0.0078*** (5.40)	0.0491*** (5.78)	-0.0572*** (-6.59)	0.0100** (2.34)	0.0038 (0.78)	0.0056*** (5.68)	0.0273*** (4.65)	-0.0401*** (-6.78)
MV	0.236*** (2.70)	-0.0766 (-0.76)	-0.0372* (-1.89)	0.0921 (0.80)	-0.418*** (-3.54)	0.215** (2.48)	-0.0659 (-0.66)	-0.0395** (-2.01)	0.0474 (0.41)	-0.391*** (-3.32)
MTB	0.702*** (5.92)	0.730*** (5.34)	0.0800*** (3.00)	0.231 (1.48)	-0.223 (-1.39)	0.743*** (6.30)	0.743*** (5.50)	0.0837*** (3.14)	0.244 (1.54)	-0.248 (-1.55)
Profitability	-1.112* (-1.86)	-2.419*** (-3.52)	-0.102 (-0.83)	-0.436 (-0.60)	-0.0482 (-0.07)	-1.441** (-2.50)	-2.753*** (-4.18)	-0.101 (-0.85)	-1.005 (-1.42)	-0.0438 (-0.06)
Price Inverse	-0.480*** (-4.64)	-0.227* (-1.90)	0.0295** (2.10)	0.472*** (5.74)	-0.491*** (-5.83)	-0.431*** (-4.31)	-0.217* (-1.89)	0.0275* (1.97)	0.454*** (5.45)	-0.481*** (-5.73)
Observations R^2	448 0.3847	448 0.1718	489 0.1214	489 0.1787	489 0.2312	440 0.3722	440 0.1702	481 0.1031	481 0.1424	481 0.2161
Table 5. Continued										
WAL2	-0.052 (-0.39)	-0.169 (-1.10)	-0.0071 (-0.24)	-0.836*** (-4.75)	0.368** (2.04)	- -	- -	- -	- -	- -
WAL2*Largest	0.0006 (0.26)	0.0015 (0.52)	0.0006 (0.96)	0.0128*** (3.85)	-0.0082** (-2.40)	- -	- -	- -	- -	- -
WAL3	- -	- -	- -	- -	- -	0.147 (0.73)	0.145 (0.63)	0.0439 (0.96)	-0.820*** (-3.04)	0.0477 (0.17)
WAL3*Largest	- -	- -	- -	- -	- -	-0.0033 (-1.01)	-0.0037 (-0.99)	-0.0002 (-0.24)	0.0098** (2.18)	-0.0028 (-0.61)
Largest	0.0106* (1.78)	0.0055 (0.80)	0.0065*** (4.73)	0.0474*** (5.90)	-0.0529*** (-6.43)	0.0067 (1.32)	-0.0002 (-0.04)	0.0055*** (4.72)	0.0331*** (4.78)	-0.0415*** (-5.92)
MV	0.206** (2.38)	-0.0877 (-0.88)	-0.0410** (-2.09)	0.0199 (0.17)	-0.371*** (-3.17)	0.211** (2.41)	-0.0802 (-0.80)	-0.0367* (-1.85)	-0.0069 (-0.06)	-0.388*** (-3.26)
MTB	0.746*** (6.27)	0.755*** (5.54)	0.0769*** (2.87)	0.280* (1.80)	-0.227 (-1.42)	0.756*** (6.33)	0.757*** (5.51)	0.0749*** (2.77)	0.312* (1.96)	-0.224 (-1.38)
Profitability	-1.444** (-2.49)	-2.682*** (-4.03)	-0.111 (-0.92)	-0.55 (-0.78)	-0.122 (-0.17)	-1.537*** (-2.66)	-2.871*** (-4.32)	-0.125 (-1.04)	-0.796 (-1.12)	0.0688 (0.10)
Price Inverse	-0.435*** (-4.31)	-0.242** (-2.09)	0.0284** (2.02)	0.441*** (5.40)	-0.484*** (-5.78)	-0.425*** (-4.21)	-0.216* (-1.86)	0.0294** (2.09)	0.442*** (5.31)	-0.492*** (-5.83)
Observations R^2	448 0.3710	448 0.1667	489 0.1024	489 0.1762	489 0.2243	448 0.3728	448 0.1651	489 0.1031	489 0.1501	489 0.2146

Table 6. Stock Liquidity and Asset Liquidity Conditional on Ownership Concentration: System-GMM

*Table 6 reports estimation results of the stock liquidity model including an interaction term between Largest and each of the asset liquidity measures and using System-GMM. Variable definitions are presented in Table 1. z-statistics are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% respectively. [a] indicates significance at the 1%.*

	Quoted Spread	***Proportional Spread***	***Zero***	***Price Impact***	***Turnover***	***Quoted Spread***	***Proportional Spread***	***Zero***	***Price Impact***	***Turnover***
WAL1	-0.298*** (-3.19)	-0.342*** (-3.05)	-0.0232 (-0.97)	-0.506*** (-3.80)	0.268* (1.94)	- -	- -	- -	- -	- -
WAL1*Largest	0.0038** (2.11)	0.0045** (2.09)	0.00085* (1.82)	0.0097*** (3.74)	-0.0068** (-2.53)	- -	- -	- -	- -	- -
WAL1A	- -	- -	- -	- -	- -	-1.869 (-1.55)	-2.017 (-1.46)	0.165 (0.59)	-3.038* (-1.87)	-0.0644 (-0.04)
WAL1A*Largest	- -	- -	- -	- -	- -	0.0397* (1.73)	0.0517** (1.96)	-0.0031 (-0.58)	0.0531* (1.72)	0.0061 (0.20)
Largest	0.0506*** (3.88)	0.0357** (2.28)	0.0115*** (3.41)	0.0838*** (4.48)	-0.0659*** (-3.39)	0.0200** (2.31)	0.0269*** (2.71)	0.007*** (3.47)	0.0354*** (3.03)	-0.0336*** (-2.93)
MV	0.276** (2.01)	0.0473 (0.29)	-0.0774** (-2.16)	0.0799 (0.40)	-0.613*** (-2.96)	-0.543*** (-3.99)	-0.747*** (-4.78)	-0.160*** (-4.94)	-0.787*** (-4.21)	0.338* (1.84)
MTB	1.095*** (4.80)	1.273*** (4.66)	0.0496 (0.84)	0.724** (2.21)	0.146 (0.43)	1.468*** (8.62)	1.329*** (6.79)	0.266*** (7.03)	1.064*** (4.87)	-1.123*** (-5.24)
Profitability	0.805 (0.57)	3.634** (2.14)	-1.128*** (-3.08)	-5.121** (-2.52)	3.912* (1.86)	-0.143 (-0.11)	-1.199 (-0.84)	-0.342 (-1.25)	-3.989** (-2.53)	2.084 (1.34)
Price Inverse	-0.428** (-2.00)	0.305 (1.19)	0.0849** (2.05)	0.806*** (3.51)	-1.076*** (-4.52)	-0.642** (-2.50)	-0.365 (-1.24)	0.0395 (0.71)	0.549* (1.70)	-0.345 (-1.09)
Observations ***Arellano-Bond*** ***Sargan Test***	448 -1.53 60.65	448 -1.01 51.58	489 -0.47 64.90	489 -0.41 117.75[a]	489 0.12 83.92[a]	440 -0.88 53.01	440 -0.98 56.43	481 -0.65 101.91[a]	481 0.21 82.15[a]	481 -0.01 130.92[a]
Table 6. Continued										
WAL2	-0.227 (-1.14)	0.190 (0.87)	-0.0646 (-1.25)	-0.219 (-0.78)	0.611** (2.12)	- -	- -	- -	- -	- -
WAL2*Largest	-0.0012 (-0.40)	-0.0076 (-1.28)	0.0007 (0.94)	0.0032 (0.76)	-0.00998** (-2.31)	- -	- -	- -	- -	- -
WAL3	- -	- -	- -	- -	- -	-0.0908 (-0.33)	0.363 (1.19)	0.0060 (0.08)	-0.315 (-0.76)	0.307 (0.72)
WAL3*Largest	- -	- -	- -	- -	- -	-0.0036 (-0.90)	-0.0104 (-1.38)	-0.0002 (-0.20)	0.0034 (0.58)	-0.0059 (-0.97)
Largest	0.0188* (1.71)	-0.0039 (-0.32)	0.0063** (2.21)	0.0329** (2.13)	-0.0223 (-1.41)	0.0059 (0.67)	-0.0036 (-0.37)	0.0013 (0.56)	0.0107 (0.82)	0.0004 (0.03)
MV	0.318** (1.97)	0.190 (1.06)	-0.0544 (-1.27)	0.331 (1.43)	-0.497** (-2.09)	0.0791 (0.69)	-0.153 (-1.21)	-0.0307 (-0.97)	-0.0703 (-0.41)	-0.396** (-2.25)
MTB	0.978*** (4.74)	0.905*** (3.96)	0.0827 (1.54)	0.223 (0.77)	0.0718 (0.24)	1.241*** (6.05)	1.273*** (5.62)	-0.0049 (-0.09)	0.550* (1.82)	0.34 (1.10)
Profitability	-1.079 (-0.77)	-1.157 (-0.74)	-0.739** (-2.00)	-2.688 (-1.34)	1.003 (0.49)	-2.129* (-1.75)	-2.042 (-1.52)	-1.070*** (-3.26)	-6.958*** (-3.88)	4.012** (2.19)
Price Inverse	-0.675** (-2.37)	-0.522* (-1.65)	0.131*** (3.13)	0.892*** (3.94)	-0.787*** (-3.38)	-0.876*** (-3.58)	-0.392 (-1.45)	0.136*** (3.02)	0.940*** (3.82)	-0.831*** (-3.30)
Observations ***Arellano-Bond*** ***Sargan Test***	448 -1.14 80.34[a]	448 -0.99 74.74[a]	489 -0.54 97.61[a]	489 0.02 165.34[a]	489 0.47 160.54[a]	448 -1.12 85.60[a]	448 -1.18 71.12	489 -0.48 87.78[a]	489 -0.18 126.19[a]	489 0.45 121.64[a]

As for the control variables, we find strong evidence that ownership concentration is negatively related to liquidity. The variable *Largest* is positively and significantly related to our proxies of illiquidity measures, except for *Proportional Spread*, and negatively and significantly related to our liquidity measure, *Turnover*. This result indicates *Largest* is negatively related to liquidity. In addition, we find that the firm's market value *MV* is positively and significantly related to *Quoted Spread* and negatively and significantly related to *Turnover*, indicating that *MV* is negatively related to liquidity. This result is consistent with the evidence reported in Gopalan et al. (2012). However, *MV* is significantly and negatively related to Zero, indicating that MV is positively related to MV. This result supports the findings reported in Charoenwong et al. (2014). We also find that MTB is positively and significantly related to *Proportional Spread*, *Quoted Spread* and *Zero*. These findings indicate that *MTB* is negatively related to liquidity. The firm's profitability, *Profitability*, when significant, is negatively related to measures of stock liquidity and positively related to the measure of stock liquidity indicating that the firm's profitability is positively related to liquidity. Finally, *Price Inverse* is negatively related to trading costs especially *Quoted Spread*. However, it is positively related to other illiquidity measures, *Zero* and *Price Impact* and negatively related to *Turnover*.

6. CONCLUSION

This paper investigates the impact of asset liquidity on stock liquidity using a sample of firms listed on the ASE during the period 2001-2012. In this study, we examine how ownership concentration affects the relationship between asset and stock liquidity. Excess liquid assets increase the scope of large shareholders' discretion and hence may result in increasing the uncertainty of assets in place rather than reducing it. Free cash flows increase large-controlling shareholders' power due to the existence of more resources under their control. In addition, it is less costly to turn liquid assets into private benefits compared to other assets. Therefore, in the absence of investor protection, large shareholders may have incentives to appropriate liquid assets. The uncertainty regarding the usage of liquid assets in cash-rich firms leads to greater uncertainty regarding the firm's cash flows and hence investors trade the stocks of cash-rich firms controlled by large shareholders at a premium. Therefore, the sensitivity of stock liquidity to asset liquidity is expected to be negative for companies with concentrated ownership.

The results show some evidence that asset liquidity measures are negatively related to trading costs, price impact and the proportion of zero trading days and positively related to the turnover ratio. These results indicate that on average asset liquidity is positively related to stock liquidity. In addition, the results indicate that the interaction between asset liquidity measures with the ownership concentration measure is positively related to illiquidity measures (negatively related to the turnover ratio). This result indicates that liquid assets in companies with (without) large shareholders reduce (enhance) stock liquidity. Excess cash in companies with large shareholders increase the scope of large shareholders' discretion which leads to greater uncertainty about the firm's future cash flows. Therefore the sensitivity of stock liquidity to asset liquidity is negative for companies with concentrated ownership. The evidence presented in this paper, although inconclusive, is important as it shows that ownership structure influences the relationship between stock and asset liquidity. Future research can re-examine this issue by investigating other economies with varying degrees of investor protection.

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