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Market liquidity and stock returns in the Norwegian stock market

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ABSTRACT

We analyze the liquidity sensitivity of stock returns in the Norwegian stock market over the period 1983–2015. Even though the liquidity measures we apply are standard in the literature, we find no evidence of a relationship between returns and market liquidity. This is in strong contrast to the evidence of a significant sensitivity to liquidity in the US market, and suggest further analysis on the topic.

1. Introduction

Liquidity is broadly divided into *market* and *funding* liquidity, where a change in one affects the other. In this paper we investigate the impact of market liquidity on stock returns in the Norwegian stock market. Market liquidity is defined as the ease of trading financial assets, and has received considerable attention by both academics and practitioners the last decade. It is a concept which encompasses the driving force of any market: the ability to make money trading assets. The concept of turning assets into cash or other more liquid assets is something that every investor is, or should be, concerned about. The challenge is often to measure liquidity, and there is no single one measure that capture all facets of liquidity. Market liquidity has been studied by several authors since at least (Demsetz, 1968). The impact on stock returns has subsequently been studied by many others, see for example Roll (1984); Amihud and Mendelson (1986, 1991); Amihud (2002); Pastor and Stambaugh (2003); Acharya and Pedersen (2005); Spiegel (2008), and Amihud et al. (2015). A more recent paper, see Sensoy (2016), investigates the relationship between macroeconomic announcements and its impact on stock market

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Table 1
Summary statistics for the variables applied in the paper. All numbers are in percent and computed from daily observations.

Variable	N	Minimum	Maximum	Mean	Std.dev
r_m	8282	−21.2	10.5	0.05	1.4
BAS_t	8282	1.6	14.3	4.6	6.2
HL_t	8282	1.9	10.7	2.3	2.6
α_t	8282	0.6	14.7	2.6	1.9
TRN_t	8282	0.3	2.5	0.3	0.2

liquidity. The author investigates the Turkish stock market, and find that only US macroeconomic announcements affect commonality in liquidity. In this paper, we aim to quantify the market liquidity of stocks using a survivor bias free sample of stocks over the period 1983–2015.

2. Liquidity measures

In the paper, we analyze four different measures of liquidity; (1) The bid-ask spread derived by Amihud and Mendelson (1986), (2) A simple high-low ratio, (3) A bid-ask spread derived by Corwin and Schultz (2012), and (4) A turnover measure constructed for the Oslo Stock Exchange in Ødegaard et al. (2009). The bid-ask spread measure by Amihud and Mendelson is given by

$$BAS_t = \frac{Ask_t - Bid_t}{Ask_t} \tag{1}$$

where Ask_t is the average ask-price during the day, The simple high-low estimator we apply is the relative difference between the daily high and low prices:

$$HL_t = \frac{H_t - L_t}{H_t} \tag{2}$$

where H_t (L_t) is the highest (lowest) price during day t. This estimator is closely related to the bid-ask spread derived by Corwin and Schultz (2012), which again is given by

$$\alpha_t = (\sqrt{2}+1)\cdot(\sqrt{\beta_t} - \sqrt{\gamma_t}) \tag{3}$$

where β_t is given by the sum of two consecutive days of the squared log-ratio between high and low prices, and γ_t is given by log-ratio between the two-day maximum price divided by the two-day minimum price. Specifically,

$$\beta_t = \sum_{j=0}^{1}\left(\ln\frac{H_{t+j}}{L_{t+j}}\right)^2 \tag{4}$$

and

$$\gamma_t = \left(\ln\frac{\max\{H_t, H_{t-1}\}}{\min\{L_t, L_{t-1}\}}\right)^2 \tag{5}$$

The Corwin-Schultz measure is a proxy for market liquidity, and shows significant time-variation. The turnover-ratio is a measure of a stock's trading activity, which is computed by taking the number of stocks traded every day divided by the total number of outstanding stocks. The equation is

$$TRN_t = \frac{\text{Number of shares traded at day } t}{\text{Number of shares outstanding at day } t} \tag{6}$$

All these estimators of liquidity have been applied in studies investigating the liquidity premium previously. However, many of the studies focus on the US stock market solely. In this paper we compute these liquidity measures for all stocks that is, or has been, listed at the Oslo Stock Exchange during the period January 1st 1983 through December 31st 2015 (Figs. 1 and 2).

Table 1summarizes the variables applied in this paper. As one can see, there is substantial variation in the variables.

3. Data sample and benchmark model

Our key objective is to examine the relationship between stock returns and market liquidity in the Norwegian stock market. We apply a survivor bias free sample of Norwegian stocks over the period 1983–2015. Each stock includes daily data on prices, stock splits, reverse splits, dividends, and other corporate actions. We compute log-returns from adjusted daily prices. The benchmark market is OSEBX, an index of the 60 largest firms in the Norwegian stock market. The Norwegian stock market is small compared to the main stock markets in North America, Europe, and Asia. However, the Norwegian

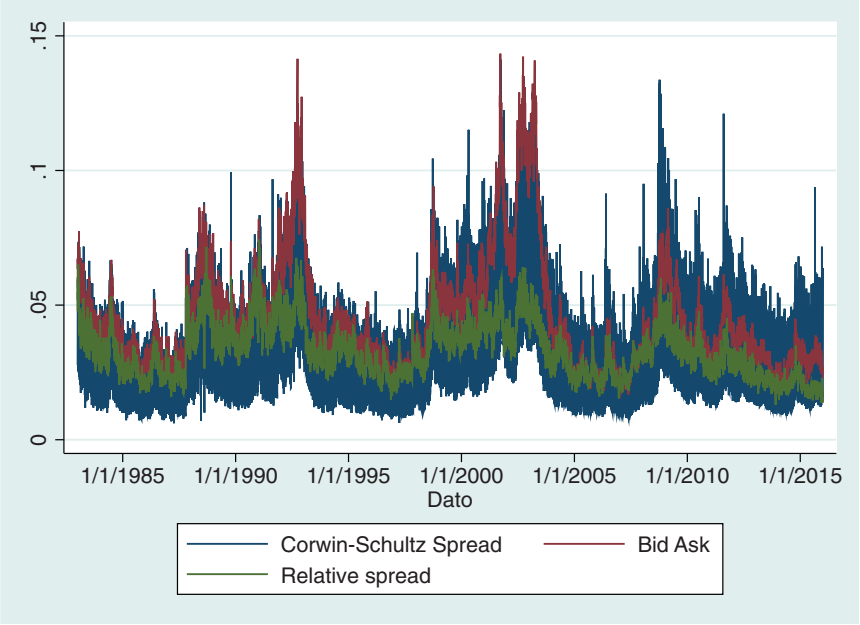

Fig. 1. Time series plot of two standardized liquidity measures given in Eqs. (1)–(3). The spreads shows significant time variability, and in particular during the fall of 1987, the dot-com bust around 2002, and during the recent financial crisis of 2007–2009.

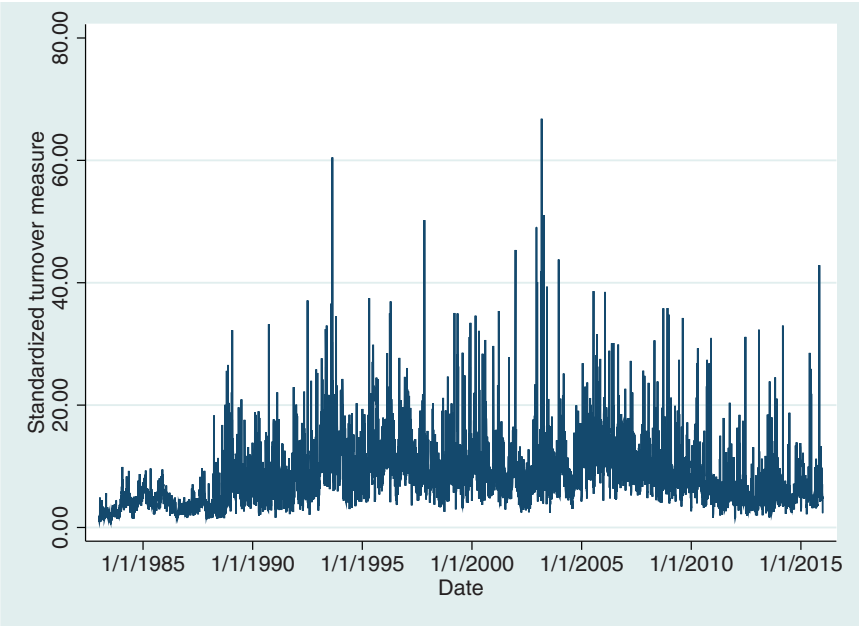

Fig. 2. Time series plot of the standardized turnover liquidity measure given in Eq. (6). Due to increased trading over the time period under investigation, the level of the turnover measure increases over time.

stock market has received considerable attention from foreign investors due to both political stability and many firms in the energy sector. As market liquidity might be related to the solvency of a firm, as few investors will trade a firm that is known to be in severe trouble, it is crucial to work with a survivor bias free dataset. To measure returns and its relationship to liquidity, we obtain a dataset that contains all stocks that has been traded at the Oslo Stock Exchange in the period under investigation. The importance of a survivor bias free sample is made clear in the paper (Edwin et al., 1996). Our dataset is downloaded from TITLON, a financial database which contains information on stocks, bonds, derivatives, and other financial instruments for firms traded at Oslo Stock Exchange. It contains detailed daily financial data with fully adjusted prices for all stocks that has been traded at the exchange since 1983.

Table 2
This table shows the regression coefficients for the model described in Eq. (7). The estimates for turnover is approximately zero, whereas for the bid-ask and high-low estimators they are significantly different from zero.

Variable	Estimates		
	α	β_m	β_{LIQ}
Bid-Ask	0.005	0.62	−0.02
	[0.0001, 6]	[0.0032, 11.2]	[0.005, −38.6]
High-Low	−0.002	0.72	0.05
	[0.00008, −7]	[0.0029, 244]	[0.001, 39]
CS Spread	−0.0002	0.61	−0.01
	[0.00004, −5]	[0.003, 231]	[0.008, −12.35]

3.1. The benchmark model

The main focus of this paper is to understand the relationship between liquidity and stock returns for firms listed on the Oslo Stock Exchange, Norway. Because the data sample consists of many firms over time, we apply a simple linear regression model for panel data. The model contains two independent variables: the market return and the returns on portfolios listed into deciles based on liquidity. The regression model is

$$r_t = \alpha + \beta_1 r_{m,t} + \beta_2 LIQ_{i,t} + \varepsilon_t \tag{7}$$

where our aim is to estimate β_1 and β_2. $LIQ_{i,t}$ is the variable measuring market liquidity, and will be one of the three main variables given in Eqs. (1), (2), and (6). The variables are summarized in Table 1 in Section 2. Such a model is often called a fundamental factor model, where the liquidity factors are the attributes of the stocks. Our aim is to investigate if these factors are important in explaining stock returns.

3.2. Empirical results

This section highlights the results of our analysis. Table 2 lists the regression coefficients for the various models applied in the paper.

The regression estimates in Table 2 shows that the liquidity coefficients are not significant. The general impact the bid-ask spread gives a coefficient of approximately −0.02. The corresponding R^2 is very low; 0.0037. The conclusion is that the bid-ask spread does not have any significant impact on stock returns for the Norwegian stock market. The same holds true for both the High-Low measure, and the relative spread. From the output of our regression analysis, it seems that the level of market liquidity is economically significant for the pricing of stocks in the Norwegian financial market. The reason for this result can be due to the frequency of the observations, which are daily. The volatility of liquidity is large, and can impact the results a lot. In addition, there are several well-known liquidity shocks in the Norwegian market during the period under investigation, most recently the drawdown in oil prices and its impact on market wide liquidity in the Norwegian market. One way to circumvent this potential pitfall, is to compute monthly averages for returns, and the various liquidity measures, a procedure not uncommon in the literature. However, the strength of applying daily data is the capacity to incorporate effects from different days, holidays, and just the fact that less information is lost in averaging. In additionally data is superior in short/medium term forecasting, as days of the week have different patterns which can be identified at this level.

4. Conclusion

We estimate the impact of liquidity on stock returns in the Norwegian stock market over the period 1983 through 2015. We find that even though the liquidity beta-coefficients are statistically significant, they are not economically significant with a very low R^2's. Based on this we conclude that the level of market liquidity has negligible impact on stock returns in Norway.

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