What Drives Stock Market Underreaction to Liquidity Shocks? Evidence from Korea

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Motivation

- Although disputable, it is widely believed that well-developed equity markets should be largely semistrong-form efficient.
- However, if some frictions in equity markets prevent available information from being fully reflected in stock prices, the prices can adjust slowly to new information.
  - Empirical evidence on stock market underreaction
    - Earnings momentum, or post-earnings announcement drift (Ball and Brown, 1968; Bernard and Thomas, 1990)
    - Price momentum (Jegadeesh and Titman, 1993)

Motivation

- Another empirical evidence has been recently documented by Bali, Peng, Shen, and Tang (2014, RFS).
  - They focus on stock market reactions to news about stock-level liquidity, a type of publicly available information.
  - In the U.S. stock market, liquidity shocks are positively related to future stock returns for up to six months, as well as contemporaneous returns, in the cross section.
    - ➢ In an efficient market, a negative liquidity shock results in an immediate decrease in stock prices.
    - ➔ A *positive* relation between liquidity shocks and *contemporaneous* returns

Motivation

- If the stock prices do not fully respond to the negative shock in the same month, the prices will continue to adjust to it for the following months.

➔ A *positive* relation between liquidity shocks and returns in the *subsequent* months

- They also argue that both limited investor attention and illiquidity are relevant to the underreaction.
  - Limited attention is significant in explaining both short- and long-term return predictability, while illiquidity is associated with only short-term predictability.
  - Their results support *limited attention* as a primary force driving the underreaction to liquidity shocks.

Motivation

- Inspired by Bali et al., this study aims to investigate how stock prices react to liquidity shocks in the Korean stock market and the underlying mechanisms.
  - Stocks prices can slowly react to liquidity shocks in the presence of two potential market frictions: illiquidity and limited investor attention.
    - ➢ Illiquidity deters investors from immediately trading based on new information.
    - ➢ Limited attention hampers investor's information processing.
  - The cross-sectional relation between liquidity shocks and stock returns in Korea has not been previously studied.
    - ➢ Moreover, a primary mechanism that explains stock market reactions could differ substantially across countries.

Motivation

- A distinctive feature of the Korean stock market is that individual participate in equity trading more actively than institutions do.
  - The aggregate trading volume of individual investors amounts to 58%, on average, of the total trading volume during the period 2001 through 2015.
  - It is in remarkable contrast to the U.S. market, known for institutional investors dominating as equity holders and a substantial downward trend in individual equity ownership.
    - Institutional equity holdings accounted for more than 50% of the total U.S. equity ownership in 1999 (Bennet, Sias, Starks, 2003).
    - The fraction of U.S. equity directly owned by individuals has shown a considerable downward trend from 48% in 1980 to around 20% in 2012 (Stambaugh, 2014).

Motivation

- This big difference from the U.S. market could impact price discovery in the Korean stock market in two different ways.
  - On the one hand, the active participation of retail traders could mean the aggregate level of investor attention is relatively higher.
    - ➢ Constraints on investor attention could be less binding and stock prices could therefore respond more efficiently to available information.
  - On the other hand, since individual investors are often believed as not fully rational, noise traders, price discovery could be more delayed by their heavy trading, resulting in market inefficiency.
- These two conflicting predictions make this study more interesting and increase the need for an independent study in the Korean stock market.

Motivation

- One difficulty in this study is that both illiquidity and investor inattention are intangible and elusive concepts and therefore cannot be precisely measured by any single empirical proxy.
  - Not only do I employ four individual measures of liquidity and attention, but I also construct composite measures of stock-level liquidity and investor attention, called the *liquidity score* and *attention score*, respectively.
    - The liquidity score (attention score) is constructed by averaging cross-sectional rankings of a stock based on the different individual measures of liquidity (attention).
  - While individual measures may contain some measure-specific errors, these errors can be largely diversified away and only the common component of the individual variables will remain in the composite measure.

Summary of Findings

- In the Korean stock market, stock-level liquidity shocks are positively related to one-month-ahead stock returns as well as contemporaneous returns.
  - Stock prices do not immediately reflect news about stock-level liquidity and continues to adjust to it in the following month.
- Unlike in the U.S. market, however, the return predictability based on liquidity shocks becomes insignificant for longer-horizon future returns.
  - This suggests that liquidity shocks are fully incorporated into stock prices within the following month and thus the prices no longer react to the news afterward.

Summary of Findings

- The positive relation between liquidity shocks and one-month-ahead returns is most pronounced for illiquid stocks but not present for liquid stocks.
  - This result is not affected by liquidity measures and independent of the level of investor attention.
- In contrast, the effect of limited attention on the positive relation differs across alternative attention proxies.
  - This suggests that, although the underreaction to liquidity shocks could be partly due to limited attention, it is primarily driven not by inattention but by illiquidity in Korea.

Data and Variables

- Data on all ordinary common stocks listed on the Korea Stock Exchange from 2001 to 2015
  - Daily and monthly stock returns, trading volume, market capitalization, the number of shares outstanding
  - Annual accounting data for the book value of equity
  - Consensus data for the analyst coverage
  - Monthly returns on the one-year monetary stabilization bond for the risk-free rates of return.

Data and Variables

- Definition of liquidity shock
  - The illiquidity of an individual stock is measured based on the price impact measure of Amihud (2002):

$$ILLIQ_{i,t} = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} \frac{|R_{i,d}|}{DVOL_{i,d}},$$

    - $R_{i,d}$ is stock i's return on day d, $DVOL_{i,d}$ is the trading volume in dollars for stock i on day d, $D_{i,t}$ is the number of trading days with positive volume for stock i in month t.
  - The liquidity shock of stock i in month t is defined as the opposite-signed Amihud's illiquidity minus its past 12-month average:

$$LIQU_{i,t} = -\left(ILLIQ_{i,t} - AVGILLIQ_{i;t-12,t-1}\right).$$

Data and Variables

- Alternative liquidity measures
  - Brennan, Huh, Subrahmanyam (2013) illiquidity:

$$BHS_{i,t} = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} \frac{|R_{i,d}|}{TURN_{i,d}}$$

    - $TURN_{i,d}$ is the daily share turnover for stock i on day d.
  - Trading continuity measure of Liu (2006):

$$LM12_{i,t} = \Big[\text{Number of zero trading days for stock } i \text{ over month } t-11 \text{ to month } t + \frac{1/500}{\text{sum of daily turnover for stock } i \text{ over month } t-11 \text{ to month } t}\Big] \times \frac{252}{NoTD},$$

    - $NoTD$ is the total number of trading days over months $t-11$ to t.
  - Monthly share turnover (*TURN*)
    - Defined as the number of traded shares divided by the number of outstanding shares

Data and Variables

- Investor attention proxies
  - Analyst coverage (*CVRG*)
    - Defined as the number of estimates for earnings forecasts for the current fiscal year
  - Firm size (*ME*)
  - Detrended turnover (*DTURN*)
    - Calculated as the six-month average of monthly share turnover minus the prior 18-month average
  - Information discreteness measure of Da, Gurun, Warachka (2014):

$$ID = \text{sgn}\left(PRET\right) \times \left[\%neg - \%pos\right]$$

    - $PRET$ is a stock's cumulative return over months $t-11$ to t, $\%neg$ and $\%pos$ denote the percentage of days with negative and positive returns, respectively.

Data and Variables

- Liquidity score and attention score
  - I construct a composite liquidity and attention measure by combining cross-sectional ranks of a stock based on the four alternative individual measures.
    - The liquidity score (*LIQ_SCR*) of a stock is defined as the average of its ranking percentiles produced by *ILLIQ*, *BHS*, *LM12*, and *TURN*.
    - The attention score (*ATT_SCR*) of a stock is defined as the average of its ranking percentiles produced by *CVRG*, *ME*, *DTURN*, and *ID*.

Empirical Results

- Contemporaneous returns of portfolios sorted by liquidity shocks

	1	2	3	4	5	6	7	8	9	10	10−1
Panel A: Equal-weighted returns in month *t* of portfolios sorted by *LIQU*											
Excess return	-0.57	-0.51	-0.05	0.70	1.46	2.04	2.85	3.22	3.78	3.30	3.87
	(-1.22)	(-0.93)	(-0.08)	(1.05)	(2.25)	(2.96)	(4.67)	(5.82)	(7.19)	(5.50)	(10.89)
CAPM alpha	-1.14	-1.34	-0.93	-0.19	0.57	1.18	2.06	2.49	3.18	2.77	3.91
	(-3.99)	(-5.25)	(-3.81)	(-0.61)	(1.88)	(3.31)	(5.89)	(7.00)	(8.12)	(6.72)	(9.94)
FF3F alpha	-1.31	-1.44	-1.04	-0.29	0.40	0.95	1.82	2.23	2.93	2.55	3.86
	(-5.65)	(-5.66)	(-4.40)	(-0.99)	(1.52)	(4.06)	(8.86)	(12.35)	(10.92)	(10.88)	(10.87)
Panel B: Value-weighted returns in month *t* of portfolios sorted by *LIQU*											
Excess return	-1.62	-0.86	-0.05	0.64	1.53	1.89	2.20	2.57	2.73	1.84	3.46
	(-3.14)	(-1.75)	(-0.08)	(0.93)	(2.26)	(2.90)	(3.70)	(4.10)	(5.19)	(2.83)	(6.51)
CAPM alpha	-2.18	-1.63	-0.89	-0.24	0.59	1.03	1.43	1.90	2.13	1.33	3.50
	(-4.64)	(-6.95)	(-3.80)	(-0.83)	(1.71)	(3.01)	(4.03)	(3.72)	(5.37)	(2.73)	(6.29)
FF3F alpha	-2.18	-1.69	-0.93	-0.28	0.55	0.91	1.23	1.64	1.90	1.11	3.29
	(-4.84)	(-8.08)	(-4.08)	(-0.91)	(1.53)	(3.18)	(4.51)	(5.02)	(7.88)	(3.92)	(6.44)

Empirical Results

- One-month-ahead returns of portfolios sorted by liquidity shocks

	1	2	3	4	5	6	7	8	9	10	10−1
Panel A: Equal-weighted returns in month $t+1$ of portfolios sorted by *LIQU*											
Excess return	1.19	1.33	1.09	1.10	1.36	1.48	1.57	1.73	1.66	2.15	0.96
	(2.38)	(2.66)	(2.15)	(2.01)	(2.28)	(2.34)	(2.50)	(3.05)	(2.45)	(3.18)	(2.62)
CAPM alpha	0.60	0.59	0.26	0.25	0.48	0.60	0.78	1.00	0.98	1.55	0.95
	(2.37)	(2.24)	(1.27)	(0.99)	(1.98)	(1.93)	(2.37)	(2.85)	(2.14)	(3.24)	(2.48)
FF3F alpha	0.45	0.41	0.10	0.13	0.35	0.40	0.57	0.78	0.72	1.32	0.87
	(2.30)	(1.80)	(0.46)	(0.59)	(1.37)	(1.48)	(2.25)	(3.96)	(3.97)	(5.99)	(2.79)
Panel B: Value-weighted returns in month $t+1$ of portfolios sorted by *LIQU*											
Excess return	0.08	0.89	0.90	1.04	1.03	1.22	1.66	1.73	1.04	0.92	0.84
	(0.21)	(1.70)	(1.90)	(1.86)	(1.79)	(2.01)	(2.60)	(3.00)	(1.66)	(1.29)	(1.91)
CAPM alpha	-0.41	0.16	0.10	0.20	0.19	0.35	0.81	1.01	0.40	0.32	0.73
	(-1.59)	(0.67)	(0.66)	(0.72)	(0.67)	(1.03)	(2.58)	(2.78)	(0.89)	(0.58)	(1.66)
FF3F alpha	-0.49	0.07	0.01	0.14	0.26	0.22	0.65	0.81	0.20	0.08	0.57
	(-2.46)	(0.30)	(0.03)	(0.52)	(0.83)	(0.71)	(2.24)	(3.09)	(0.85)	(0.24)	(1.66)

Empirical Results

- Long-horizon returns of portfolios sorted by liquidity shocks

	1	2	3	4	5	6	7	8	9	10	10−1	FF3F alpha
2-month	1.81	1.42	1.14	1.11	1.19	1.21	1.60	1.55	1.98	1.98	0.18	0.14
	(3.11)	(2.51)	(2.25)	(2.17)	(2.43)	(1.89)	(2.37)	(2.68)	(3.22)	(3.11)	(0.70)	(0.61)
3-month	1.91	1.30	1.55	1.34	1.30	1.03	1.30	1.60	1.78	2.11	0.19	0.16
	(3.33)	(2.47)	(2.71)	(2.35)	(2.23)	(1.82)	(2.05)	(2.71)	(2.84)	(3.49)	(0.68)	(0.59)
4-month	1.87	1.47	1.19	1.45	1.31	1.25	1.57	1.28	1.67	1.87	0.01	0.05
	(3.52)	(2.67)	(2.19)	(2.62)	(2.25)	(2.07)	(2.45)	(1.99)	(2.64)	(3.08)	(0.02)	(0.17)
5-month	1.77	1.43	1.35	1.20	1.27	1.33	1.63	1.50	1.41	2.10	0.34	0.28
	(3.40)	(2.79)	(2.48)	(2.19)	(2.02)	(2.23)	(2.71)	(2.50)	(2.25)	(3.37)	(1.21)	(1.04)
6-month	1.62	1.50	1.26	1.11	1.29	1.50	1.79	1.36	1.64	1.99	0.36	0.34
	(2.85)	(2.48)	(2.35)	(2.06)	(2.25)	(2.47)	(2.86)	(2.62)	(2.54)	(3.08)	(1.37)	(1.30)

Empirical Results

- Fama–MacBeth cross-sectional regressions

	(1)	(2)	(3)	(4)	(5)	(6)
LIQU	0.11	0.10	0.10	0.11	0.10	0.10
	(4.35)	(3.80)	(3.81)	(4.11)	(3.61)	(3.60)
ME	-0.52	-0.49	-0.48	-0.40	-0.40	-0.39
	(-2.60)	(-3.10)	(-3.07)	(-2.96)	(-3.03)	(-3.05)
BM	0.65	0.66	0.65	0.64	0.66	0.65
	(3.40)	(3.43)	(3.45)	(3.40)	(3.39)	(3.41)
MOM	0.01	0.01	0.01	0.01	0.01	0.01
	(2.86)	(2.79)	(2.77)	(2.87)	(2.79)	(2.77)
REV	-0.01	-0.02	-0.02	-0.01	-0.02	-0.02
	(-1.49)	(-1.80)	(-1.78)	(-1.49)	(-1.82)	(-1.80)
IVOL	-0.33	-0.34	-0.33	-0.31	-0.32	-0.31
	(-2.51)	(-2.60)	(-2.55)	(-2.23)	(-2.33)	(-2.27)
MAX	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(-0.50)	(-0.45)	(-0.49)	(-0.47)	(-0.42)	(-0.46)
ILLIQ	0.11	0.12	0.12	0.12	0.13	0.13
	(1.72)	(1.63)	(1.63)	(1.85)	(1.75)	(1.75)
TURN	-1.40	-1.32	-1.34	-1.40	-1.32	-1.34
	(-6.06)	(-5.59)	(-5.73)	(-6.50)	(-5.94)	(-6.11)
CVILLIQ	-0.07	-0.22	-0.23	-0.08	-0.23	-0.24
	(-0.52)	(-1.77)	(-1.82)	(-0.58)	(-1.85)	(-1.91)
SDTURN	0.34	0.31	0.31	0.33	0.29	0.29
	(2.20)	(2.08)	(2.05)	(2.14)	(2.01)	(1.98)
BETA	0.02	0.22	0.29	0.03	0.23	0.29
	(0.08)	(1.42)	(1.87)	(0.11)	(1.45)	(1.89)

Empirical Results

- Portfolios sorted by a liquidity measure and liquidity shock

	Ranking on *LIQU*						
	1	2	3	4	5	5−1	FF3F alpha
Panel A: Portfolios sorted by *LIQU* within *ILLIQ* subgroups							
Low *ILLIQ*	1.05	1.11	1.01	1.31	-0.17	-1.22	-1.30
	(2.07)	(2.03)	(1.80)	(2.26)	(-0.26)	(-2.91)	(-3.36)
2	0.82	0.98	1.50	1.10	0.27	-0.55	-0.73
	(1.57)	(1.50)	(2.87)	(1.66)	(0.32)	(-0.88)	(-1.53)
3	1.11	1.38	2.10	1.57	1.48	0.38	0.37
	(1.80)	(2.34)	(3.34)	(2.22)	(2.37)	(0.85)	(0.93)
4	1.65	1.63	1.85	2.16	2.29	0.64	0.84
	(2.77)	(2.41)	(2.67)	(3.50)	(3.95)	(1.45)	(2.13)
High *ILLIQ*	1.31	1.71	2.12	2.37	2.73	1.42	1.37
	(2.25)	(3.01)	(3.77)	(3.87)	(3.94)	(3.65)	(3.36)
High − low	0.26	0.60	1.11	1.07	2.90	2.64	2.67
	(0.63)	(1.67)	(2.65)	(2.47)	(5.92)	(4.79)	(4.98)
Panel B: Portfolios sorted by *LIQU* within *BHS* subgroups							
Low *BHS*	0.44	0.26	0.61	0.18	0.39	-0.05	-0.05
	(0.75)	(0.44)	(0.96)	(0.26)	(0.43)	(-0.08)	(-0.09)
2	1.70	1.56	1.74	1.95	1.88	0.18	0.39
	(2.56)	(2.48)	(2.62)	(3.05)	(3.02)	(0.37)	(0.78)
3	1.81	1.35	1.44	1.92	2.71	0.90	0.92
	(3.28)	(2.39)	(2.07)	(2.86)	(3.96)	(1.80)	(2.47)
4	1.53	1.47	1.50	1.99	2.68	1.15	1.16
	(3.19)	(2.66)	(2.52)	(3.28)	(4.24)	(2.97)	(3.43)
High *BHS*	1.19	0.97	1.65	1.57	1.90	0.71	0.69
	(2.22)	(2.01)	(3.09)	(2.68)	(3.33)	(2.78)	(2.56)
High − low	0.75	0.70	1.04	1.39	1.51	0.76	0.74
	(1.64)	(1.74)	(3.21)	(2.87)	(2.42)	(1.24)	(1.36)

Empirical Results

- Portfolios sorted by a liquidity measure and liquidity shock

	Ranking on *LIQU*						
	1	2	3	4	5	5−1	FF3F alpha
Panel C: Portfolios sorted by *LIQU* within *LM12* subgroups							
Low *LM12*	1.61	0.53	0.73	0.97	0.46	-1.16	-1.19
	(2.49)	(0.93)	(1.13)	(1.54)	(0.53)	(-2.02)	(-2.16)
2	1.63	1.27	1.52	2.14	2.26	0.63	0.65
	(2.87)	(2.23)	(2.20)	(2.79)	(2.95)	(1.19)	(1.46)
3	1.28	1.29	1.62	1.54	2.71	1.43	1.23
	(2.55)	(2.28)	(2.53)	(2.91)	(4.21)	(4.37)	(3.82)
4	1.49	1.06	1.87	1.90	2.51	1.01	0.94
	(3.32)	(2.08)	(3.06)	(3.60)	(4.67)	(3.31)	(4.06)
High *LM12*	0.74	1.01	1.29	0.96	2.11	1.37	1.36
	(1.48)	(1.83)	(1.91)	(1.37)	(2.98)	(3.49)	(3.59)
High − low	-0.88	0.48	0.55	-0.01	1.66	2.53	2.55
	(-1.94)	(1.48)	(1.50)	(-0.01)	(3.65)	(4.42)	(4.40)
Panel D: Portfolios sorted by *LIQU* within *TURN* subgroups							
Low *TURN*	0.88	0.96	1.60	1.64	2.15	1.26	1.25
	(1.75)	(2.14)	(2.73)	(2.91)	(4.16)	(6.39)	(6.13)
2	1.93	1.22	1.49	2.00	2.68	0.75	0.78
	(3.73)	(2.68)	(2.31)	(3.02)	(4.91)	(2.60)	(2.79)
3	1.81	1.46	1.70	1.89	2.53	0.72	0.89
	(2.69)	(2.54)	(2.49)	(2.96)	(4.20)	(1.32)	(1.91)
4	1.69	1.42	1.51	1.84	2.52	0.83	1.01
	(2.75)	(2.31)	(2.26)	(3.00)	(3.53)	(1.77)	(2.15)
High *TURN*	-0.05	0.50	0.23	-0.28	0.37	0.41	0.53
	(-0.07)	(0.73)	(0.35)	(-0.40)	(0.35)	(0.59)	(0.83)
Low − high	0.93	0.46	1.38	1.92	1.78	0.85	0.73
	(2.38)	(0.92)	(3.16)	(4.30)	(2.18)	(1.13)	(1.03)

Empirical Results

- Portfolios sorted by an attention measure and liquidity shock

	Ranking on *LIQU*						
	1	2	3	4	5	5−1	FF3F alpha
Panel A: Portfolios sorted by *LIQU* within *CVRG* subgroups							
Low *CVRG*	1.18	1.40	1.40	1.27	2.22	1.04	0.97
	(2.28)	(2.24)	(2.12)	(1.93)	(3.14)	(2.91)	(2.94)
2	0.86	1.24	1.85	1.97	1.64	0.79	0.85
	(1.68)	(1.90)	(3.22)	(2.68)	(2.87)	(1.76)	(1.86)
3	0.81	1.12	1.20	1.45	2.22	1.41	1.43
	(1.72)	(1.77)	(1.93)	(2.18)	(3.29)	(3.25)	(3.33)
4	0.50	1.22	1.45	1.85	2.05	1.56	1.57
	(1.04)	(1.91)	(2.36)	(2.96)	(3.91)	(5.56)	(5.50)
High *CVRG*	1.14	1.17	1.20	0.99	1.31	0.17	0.20
	(2.33)	(2.28)	(2.11)	(1.65)	(2.11)	(0.50)	(0.67)
Low − high	0.04	0.24	0.21	0.28	0.91	0.87	0.76
	(0.09)	(0.55)	(0.35)	(0.49)	(1.60)	(2.24)	(2.23)
Panel B: Portfolios sorted by *LIQU* within *ME* subgroups							
Low *ME*	1.95	2.74	2.32	2.64	3.48	1.53	1.50
	(2.94)	(3.77)	(3.51)	(3.28)	(4.38)	(3.27)	(3.10)
2	1.19	1.46	1.22	1.58	1.64	0.44	0.33
	(1.99)	(2.41)	(1.80)	(2.39)	(2.49)	(0.94)	(0.75)
3	0.61	1.02	1.52	1.78	0.99	0.37	0.30
	(1.31)	(1.59)	(2.35)	(2.96)	(1.60)	(0.83)	(0.78)
4	0.44	1.24	1.31	1.55	0.99	0.55	0.57
	(0.88)	(1.99)	(2.04)	(2.66)	(1.43)	(1.08)	(1.20)
High *ME*	0.76	1.21	1.20	1.38	1.43	0.67	0.66
	(1.59)	(2.14)	(2.22)	(2.22)	(2.58)	(2.38)	(2.73)
Low − high	1.19	1.53	1.12	1.26	2.05	0.86	0.84
	(2.47)	(3.33)	(2.01)	(2.34)	(3.66)	(1.68)	(1.67)

Empirical Results

- Portfolios sorted by an attention measure and liquidity shock

	Ranking on *LIQU*						
	1	2	3	4	5	5−1	FF3F alpha
Panel C: Portfolios sorted by *LIQU* within *DTURN* subgroups							
Low *DTURN*	1.76	1.11	0.69	1.33	1.74	-0.02	0.04
	(3.08)	(1.82)	(1.15)	(2.22)	(3.31)	(-0.06)	(0.14)
2	1.24	1.27	1.40	1.64	2.53	1.28	1.20
	(2.59)	(2.48)	(2.31)	(2.42)	(3.63)	(2.88)	(3.13)
3	1.05	1.40	1.54	1.60	1.99	0.94	0.94
	(2.13)	(2.57)	(2.56)	(2.66)	(3.77)	(3.56)	(3.76)
4	1.32	1.43	2.23	2.35	2.21	0.89	0.92
	(2.47)	(2.34)	(3.27)	(4.46)	(3.71)	(3.08)	(3.61)
High *DTURN*	0.92	1.10	0.61	0.47	1.39	0.47	0.50
	(1.43)	(1.49)	(0.88)	(0.60)	(1.38)	(0.72)	(0.84)
Low − high	0.84	0.00	0.09	0.85	0.35	-0.49	-0.45
	(2.33)	(0.01)	(0.20)	(1.79)	(0.52)	(-0.75)	(-0.77)
Panel D: Portfolios sorted by *LIQU* within *ID* subgroups							
Low *ID*	1.37	0.75	1.07	1.76	0.79	-0.58	-0.53
	(2.23)	(1.28)	(1.51)	(2.41)	(1.32)	(-1.26)	(-1.31)
2	1.10	1.19	1.35	1.53	2.04	0.94	0.78
	(2.20)	(2.10)	(2.02)	(2.38)	(2.76)	(1.75)	(1.84)
3	1.22	1.04	1.49	2.08	2.11	0.89	0.86
	(2.33)	(2.04)	(2.60)	(3.17)	(3.19)	(1.84)	(2.02)
4	1.24	1.33	1.80	2.16	2.58	1.34	1.13
	(2.41)	(2.45)	(3.24)	(3.01)	(3.24)	(3.02)	(3.17)
High *ID*	1.54	1.02	1.28	1.15	2.36	0.83	0.72
	(3.39)	(2.02)	(2.20)	(2.03)	(3.69)	(1.78)	(1.67)
Low − high	-0.17	-0.27	-0.21	0.61	-1.58	-1.41	-1.25
	(-0.48)	(-0.90)	(-0.63)	(1.91)	(-3.25)	(-2.22)	(-2.17)

Empirical Results

- Cross-sectional correlations

Panel A: Spearman correlations between liquidity variables

	ILLIQ	*BHS*	*LM12*	*TURN*
BHS	0.63			
LM12	0.41	0.68		
TURN	-0.52	-0.90	-0.64	
LIQ_SCR	-0.74	-0.95	-0.81	0.90

Panel B: Spearman correlations between attention variables

	CVRG	*ME*	*DTURN*	*ID*
ME	0.72			
DTURN	0.05	0.08		
ID	-0.01	-0.02	0.06	
ATT_SCR	0.71	0.75	0.48	0.42

Empirical Results

- Portfolios sorted by a score variable and liquidity shock

	Ranking on *LIQU*						
	1	2	3	4	5	5−1	FF3F alpha
Panel A: Portfolios sorted by *LIQU* within *LIQ_SCR* subgroups							
Low *LIQ_SCR*	1.04	1.24	1.76	2.14	2.22	1.18	1.15
	(2.00)	(2.45)	(3.01)	(3.75)	(3.93)	(4.72)	(4.51)
2	1.60	1.42	1.64	1.97	2.43	0.83	0.92
	(2.97)	(2.78)	(2.63)	(3.29)	(3.86)	(2.19)	(2.61)
3	1.70	1.28	1.59	1.90	2.24	0.53	0.51
	(2.87)	(2.25)	(2.56)	(3.36)	(3.77)	(1.37)	(1.38)
4	1.87	1.23	1.49	1.90	1.54	-0.33	-0.17
	(2.78)	(2.09)	(2.33)	(2.84)	(1.75)	(-0.50)	(-0.30)
High *LIQ_SCR*	0.49	0.60	0.85	0.63	-0.08	-0.57	-0.65
	(0.85)	(1.02)	(1.41)	(0.88)	(-0.09)	(-1.01)	(-1.19)
Low − high	0.54	0.64	0.91	1.51	2.30	1.76	1.80
	(1.18)	(1.85)	(2.57)	(3.52)	(4.32)	(3.09)	(3.31)
Panel B: Portfolios sorted by *LIQU* within *ATT_SCR* subgroups							
Low *ATT_SCR*	1.19	1.61	1.85	1.55	3.03	1.84	1.79
	(1.99)	(2.69)	(2.38)	(2.41)	(4.55)	(6.09)	(6.23)
2	1.02	1.05	1.61	1.46	2.20	1.18	1.27
	(1.77)	(1.86)	(2.44)	(2.09)	(3.38)	(2.79)	(3.22)
3	1.01	1.35	1.76	1.93	2.30	1.29	1.23
	(1.99)	(2.37)	(2.46)	(2.75)	(3.25)	(2.70)	(2.83)
4	0.98	1.26	1.45	1.30	1.17	0.19	-0.05
	(2.17)	(2.01)	(2.61)	(2.01)	(1.66)	(0.39)	(-0.18)
High *ATT_SCR*	0.95	1.25	1.39	1.29	1.39	0.44	0.30
	(2.01)	(2.24)	(2.35)	(2.17)	(2.44)	(1.44)	(1.05)
Low − high	0.25	0.36	0.46	0.26	1.64	1.39	1.48
	(0.57)	(0.88)	(0.87)	(0.54)	(3.45)	(3.30)	(3.74)

Empirical Results

- Triple-sorted portfolios based on liquidity score, attention score, and liquidity shock

	Mean returns			FF3F alpha		
	LIQ_SCR 1	*LIQ_SCR* 2	*LIQ_SCR* 3	*LIQ_SCR* 1	*LIQ_SCR* 2	*LIQ_SCR* 3
ATT_SCR 1	1.27	0.36	0.27	1.27	0.40	0.44
	(6.26)	(0.65)	(0.39)	(6.34)	(0.70)	(0.69)
ATT_SCR 2	1.04	1.13	-0.01	1.06	1.22	-0.02
	(3.50)	(3.43)	(-0.01)	(3.92)	(4.04)	(-0.03)
ATT_SCR 3	1.28	0.40	-0.58	1.22	0.20	-0.60
	(2.69)	(1.26)	(-1.14)	(3.05)	(0.86)	(-1.51)

Empirical Results

- Fama–MacBeth regressions with interaction terms

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Including the interaction of *LIQU* with liquidity dummies						
LIQU×*LIQ_L*	0.12	0.11	0.11	0.12	0.11	0.11
	(4.74)	(4.31)	(4.31)	(4.43)	(4.05)	(4.04)
LIQU×*LIQ_H*	0.87	0.78	0.77	0.81	0.72	0.71
	(1.64)	(1.48)	(1.46)	(1.53)	(1.35)	(1.34)
Panel B: Including the interaction of *LIQU* with attention dummies						
LIQU×*ATT_L*	0.13	0.12	0.12	0.13	0.12	0.12
	(4.95)	(4.43)	(4.44)	(4.75)	(4.25)	(4.25)
LIQU×*ATT_H*	0.04	0.03	0.02	0.05	0.03	0.03
	(0.79)	(0.53)	(0.48)	(0.86)	(0.63)	(0.58)
Panel C: Including the interaction of *LIQU* with both liquidity and attention dummies						
LIQU×*LIQ_L*×*ATT_L*	0.14	0.13	0.13	0.13	0.12	0.12
	(4.93)	(4.44)	(4.46)	(4.68)	(4.22)	(4.22)
LIQU×*LIQ_L*×*ATT_H*	0.18	0.16	0.16	0.20	0.18	0.18
	(2.48)	(2.40)	(2.35)	(2.51)	(2.45)	(2.40)
LIQU×*LIQ_H*×*ATT_L*	0.21	0.03	-0.02	0.24	0.04	-0.01
	(0.21)	(0.03)	(-0.02)	(0.25)	(0.04)	(-0.01)
LIQU×*LIQ_H*×*ATT_H*	-0.15	-0.28	-0.28	-0.25	-0.40	-0.40
	(-0.09)	(-0.19)	(-0.18)	(-0.16)	(-0.27)	(-0.27)

Thank You!