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How does Stock Market Liquidity Forecast Economic Growth?

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Abstract

This paper examines the relationship between stock market liquidity and the real economy in Korea during the period 1995:2–2011:4. We find that stock market liquidity is positively and significantly correlated with future economic growth. Specifically, we find that the Amihud (2002) illiquidity measure is a good predictor of the next quarter's real GDP growth. We also find that the illiquidity of small, young, non-dividend-paying, and distressed firms, which are more likely to be informationally opaque and difficult to arbitrage, is more informative when predicting future economic downturns. From the perspective of the flight to quality, the implication is that investors shift their portfolios toward safe assets when they expect the economy to be in trouble.

Keywords: Korean stock market, Economic development, Firm characteristics

1. Introduction

Numerous studies have focused on the role of the financial system in economic development in the sense that capital markets and financial intermediaries mitigate information asymmetry and transaction costs, improve the efficiency of resource allocation, and exert corporate control (King & Levine 1993; Obstfeld 1994; Bencivenga *et al.* 1995). In particular, the sudden drying up of liquidity during the recent 2008 financial crisis shed new light on the importance of stock market liquidity as a precursor of the state of the economy (Brunnermeier 2009; Næs *et al.* 2011).

This paper explores whether the liquidity of the Korean stock market has predictive power for future economic growth. The fact that Korea experienced severe liquidity shortages during the 1997 Korean financial crisis suggests that a relationship may exist between market liquidity and economic development in Korea (see Figure 1). Research on the link between market microstructure liquidity and macroeconomic conditions is useful for practitioners and policy makers. Furthermore, we examine whether the predictive ability of liquidity varies across stocks depending on firm characteristics such as size and risk. The liquidity of costlier and riskier stocks is expected to have larger effects on the forecast of future economic growth because they are more sensitive to economic conditions. Investors move away from investments in riskier, illiquid stocks given changing expectations during times of market uncertainty (flight to quality or flight to liquidity).

Previous literature provides conflicting predictions about how stock market liquidity affects future macroeconomic fundamentals. On the one hand, more liquid stock markets contribute to investing in long-run, high-return projects, thereby stimulating economic growth. Lower liquidity risk and transaction costs in liquid stock markets increase the net of transaction cost productivity of investment projects and facilitate longer maturity investments (Levine 1991; Bencivenga *et al.* 1995). According to Levine & Zervos (1998), market liquidity is positively associated with current and future economic growth, implying that stock market liquidity is a good predictor of economic development. On the other hand, some studies argue that greater market liquidity results in lower economic growth because investors are able to easily sell their shares. Enhanced market liquidity discourages shareholders from monitoring managers by decreasing the costs of shareholder exits, which weakens corporate governance, leads to inefficient resource allocation, and lowers productivity growth (Shleifer & Vishny 1986; Bhide 1993).

In recent years, Kaul & Kayacetin (2009) find that aggregate stock market order flows contribute to forecasting changes in industrial production and real GDP. Söderberg (2008) shows that macroeconomic factors and stock market variables predict liquidity by performing in-sample and out-of-sample tests. According to Næs *et al.* (2011), market-level liquidity is associated with the real economy and investors change their portfolios depending on the business cycle.

The level of liquidity varies across stocks. Small, young, risky, and non-dividend-paying stocks face the information asymmetry problem (Miller & Rock 1985; Diamond & Verrecchia 1991; Smith & Watts 1992). As such, those stocks are costly to trade and sensitive to macroeconomic conditions. This liquidity cost affects

investors' required returns and firms' costs of capital, in turn affecting the allocation of resources in the economy. Baker & Wurgler (2006) focus on cross-sectional differences in firm characteristics for the relationship between investor sentiment and stock returns. Vulnerable stocks with lack of earnings history are more affected by sentiment because the subjectivity of valuations for those stocks lead unsophisticated investors to rely on the propensity to speculate.

This paper is also related to market microstructure. Amihud & Mendelson (1986) show that liquidity affects stock prices in terms of the clientele effect of different types of investors. Chordia, Roll, & Subrahmanyam (2000) and Hasbrouck & Seppi (2001) show co-movements in liquidity and trading activity. Vayanos (2004) finds that illiquid assets become riskier whereas investors' risk aversion increases in turbulent times.

We address potential endogeneity problems by performing Granger causality tests using a vector auto regression (VAR) approach because reverse causality may exist in the relationship between the real economy and stock market liquidity. As pointed out by Söderberg (2008), macroeconomic variables forecast stock market liquidity in the opposite direction. Granger causality determines the causal effect between time series. For instance, if X contributes to improving the accuracy of the prediction of the future value of Y, then X Granger causes Y.

To test the relationship between stock market liquidity and future economic growth, we construct a dataset consisting of 437 manufacturing companies listed on the Korea Exchange (KRX) during the period from 1995:2 to 2011:4. We find that stock market liquidity, proxied by the Amihud (2002) illiquidity measure, predicts next quarter real GDP growth. With respect to Granger causality tests, we find one-way Granger causality from market liquidity to real GDP growth. Finally, information contents in liquidity differ depending on firm characteristics. That is, the illiquidity of small, young, non-dividend-paying, and high book-to-market stocks contributes to predicting future economic development whereas that of large, old, dividend-paying, and low book-to-market stocks does not provide significant predictive power.

The remainder of this paper is organized as follows. Section 2 discusses data and variables employed in the estimations. Section 3 describes the regression models used to test our hypotheses. Section 4 presents empirical results. Section 5 concludes the paper.

2. Data and Variables

The sample consists of 437 manufacturing companies with a fiscal year end of December 31 that are listed on the Korea Exchange (KRX) from 1995:2 to 2011:4. To construct the Amihud (2002) illiquidity measure (*AMIHUD*), we use data on daily stock returns, daily trading volume in Korean Won (KRW), and firms' financial statements, which are retrieved from DataGuide Pro. The data on real GDP, a five-year government bond yield, a three-year government bond yield, a call rate, a 91-day certificate of deposit interest rate, and a (AA–, three-year) corporate bond yield are collected from the Bank of Korea on a quarterly basis. Finally, the data on recession periods of Korea are obtained from the OECD (Organisation for Economic Co-operation and Development).

The Amihud measure represents the daily price sensitivity associated with daily trading volume as follows:

$$AMIHUD_{i\tau} = \frac{1}{TD_{i\tau}} \sum_{t=1}^{\tau} \frac{|R_{it}|}{Vol_{it}} \quad (1)$$

where $|R_{it}|$ is the absolute return of stock i for day t, $TD_{i\tau}$ is the number of trading days for which data are available for stock i in time window τ, and Vol_{it} is the daily trading volume in KRW. Stock returns and trading volume are winsorized at the top and bottom 1% levels to avoid spurious inferences. *AMIHUD* is initially calculated by quarter for a stock, and then equally weighted averaged across stocks for each quarter. The calculated estimates are multiplied by 10^9 for practical purposes. Note that the Amihud ratio indicates illiquidity. That is, if a security has a high *AMIHUD*, its stock price moves much higher relative to trading volume.

Figure 1 reports time-series trends of the Amihud (2002) illiquidity for Korea for 1995–2011 and indicates that stock market liquidity declines during recession periods. In particular, stock market illiquidity during the period 1997–1998 is quite impressive. Market liquidity dramatically worsened during the 1997 Asian financial crisis, consistent with Borensztein & Lee (2002). We see that the 1997 Asian financial crisis severely affected the Korean stock market, whereas the effect of the 2008 global financial crisis was relatively small.

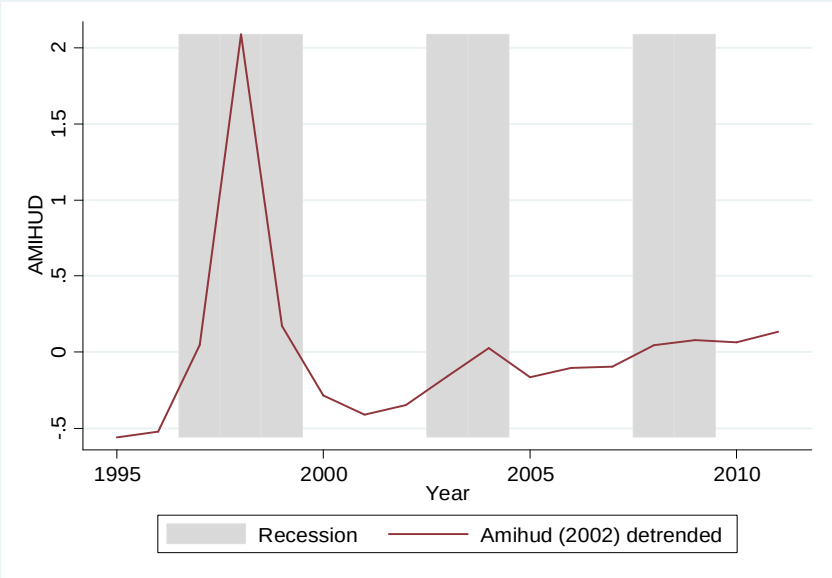

Figure 1. Relationship between Liquidity and the Business Cycle in Korea

This figure shows the time series trends of the Amihud (2002) illiquidity measure for Korea between 1995 and 2011.The Amihud ratio is seasonally adjusted using a Hodrick-Prescott filter, which is calculated for each stock on a yearly basis and then equally weighted averaged across stocks by year. The grey bars represent recession periods in Korea. The data on recession periods of Korea are obtained from the OECD.

For control variables, we employ real GDP (*R_GDP*) as a proxy of the current state of the economy, the term spread (*TERM3*) and the credit spread (*CRED3*) from the macroeconomy, and market volatility (*MVOL*) from the stock market. *R_GDP* is real GDP in billion won, and *dGDP* is the current GDP growth rate. *TERM3* is defined as the difference between the yield on a three-year government bond and a call rate. Five-year government bonds and 91-day certificate of deposit interest rates are also considered. However, the term spread measures are highly correlated with the credit spread measures. Therefore, we use the measure that consists of a three-year government bond yield and a call rate. *CRED3* is calculated as the difference between the yield on a (AA–, three-year) corporate bond and the yield on a three-year government bond. The credit spread measures using the five-year government bond are also highly correlated with the term spread measures. *MVOL* is defined as the equally weighted averages of each stock's standard deviations of daily returns during the quarter.

Table 1 shows summary statistics for the Amihud measure, macroeconomic variables, and other stock market variables. Panel A of Table 1 reports descriptive statistics for *AMIHUD* for the entire sample period. The average *AMIHUD* between 1995:2 and 2011:4 was 0.3283. Panel B shows the time-series evolution of the level of illiquidity. During the sample period, the liquidity of the Korean stock market dramatically improved. From 1995 to 1999, the average *AMIHUD* was 0.9678—primarily attributed to the 1997 Korean financial crisis—from 2000 to 2005, the average *AMIHUD* was 0.1557, and from 2006 to 2011, the average *AMIHUD* was 0.0685. Panel C provides summary statistics for macroeconomic and stock market variables.

Table 1. Descriptive Statistics

Panel A: Summary Statistics for Amihud (2002) Illiquidity Measure

Variable	Observations	Mean	Std. Dev.	Min	Max
AMIHUD	29,350	0.3283	6.4288	0	909

Panel B: Time Series Averages for Amihud (2002) Illiquidity Measure

Variable	Mean, sub periods		
	1995–1999	2000–2005	2006–2011
AMIHUD	0.9678	0.1557	0.0685

Panel C: Macroeconomic and Stock Market Variables

Variable	Observations	Mean	Std. Dev.	Min	Max
*R_GDP**	67	200,725.1	42,461.2	133,678.8	272,758.2
TERM3	67	0.0083	0.0175	-0.0872	0.0416
CRED3	67	0.0094	0.0094	-0.0008	0.0568
MVOL	67	0.0337	0.0093	0.0204	0.0551

* R_GDP: billion won

This table shows summary statistics for the variables used in estimations. Macroeconomic and stock market variables are collected on a quarterly basis. *R_GDP* is real GDP in billion won, *TERM3* is the difference between the yield on a three-year government bond and a call rate, and *CRED3* is the difference between the yield on a (AA–, three-year) corporate bond and the yield on a three-year government bond. *MVOL* indicates market volatility.

3. Methodology

3.1 Seasonal Adjustment

During the sample period, Korea experienced significant changes in the business environment and economic conditions attributable to the development of information technology, deregulation, and financial liberalization. Moreover, Korea underwent a severe financial crisis in 1997 that dramatically affected the economic system and market structure. These factors may make market liquidity and macroeconomic variables non-stationary. Therefore, we examine whether time-series variables are stationary using the Augmented Dickey-Fuller (ADF) unit root test and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. The null hypothesis of the ADF test is that the series has a unit root. The null hypothesis of the KPSS test is that a time series is stationary. For all time-series variables, we cannot reject the null hypothesis of a unit root. Therefore, we convert the non-stationary series into a stationary series by employing log differences or a Hodrick-Prescott filter. For example, the log difference of *AMHIHUD* is defined as $dAMIHUD=ln(AMIHUD_t / AMIHUD_{t-1})$. However, in the case of *TERM3* and *CRED3*, the variables are made stationary using a Hodrick-Prescott filter because they have negative values, which makes it difficult to use log differences.

Table 2 reports correlation coefficients between variables used in the estimations. *dGDP_F* is the next quarter real GDP growth rate, calculated as $dGDP\_F = ln(R\_GDP_{t+1} / R\_GDP_t)$. *dGDP* refers to the current real GDP growth rate. *dAMIHUD* is negatively and significantly correlated with *dGDP_F*, implying that greater stock market liquidity is indicative of higher economic growth in the next quarter. The coefficient between *dGDP_F* and *dGDP* is 0.3283, suggesting that a positive relationship exists between current economic growth and future economic development. The correlation coefficient of *TERM3* and *dGDP* is positive (0.6936) and statistically significant at the 1% level. In contrast, the correlation coefficient of *CRED3* and *dGDP* is negative (–0.7009) and statistically significant at the 1% level. Therefore, we perform regressions that include only *dGDP* or include *TERM3* and *CRED3* except for *dGDP* to avoid the multicollinearity problem.

Table 2. Correlation Matrix

Variable	*dGDP_F*	*dAMIHUD*	*dGDP*	*TERM3*	*CRED3*
dAMIHUD	-0.2995**				
	(0.0138)				
dGDP	0.3283***	-0.1311			
	(0.0067)	(0.2902)			
TERM3	0.4381***	-0.1801	0.6936***		
	(0.0002)	(0.1448)	(0.0000)		
CRED3	-0.3943***	0.0785	-0.7009***	-0.2036***	
	(0.001)	(0.5276)	(0.0000)	(0.0000)	
dMVOL	-0.4219***	0.0761	-0.1840	-0.1422	0.1901
	(0.0004)	(0.5407)	(0.1361)	(0.2509)	(0.1234)

This table shows correlation coefficients between the variables used in the estimations. *dGDP_F* refers to the next quarter economic growth rate. *dGDP* represents the current real GDP growth rate. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

3.2 Regression Models

To examine whether market liquidity predicts future economic development, we employ the following regression model, as in Næs *et al.* (2011):

$$GDPGR_{t+1} = \alpha + \beta AMIHUD_t + \gamma CONT_t + \varepsilon_{t+1} \quad (2)$$

where $GDPGR_{t+1}$ (*dGDP_F*) is a proxy for the economic growth at time (quarter) t+1, and $AMIHUD_t$ is a proxy for market illiquidity at time t. $CONT_t$ is a vector of control variables that affect future economic growth: the term spread, the credit spread, market volatility, and the one-quarter lagged value of the dependent variable. ε_{t+1} is the error term.

To test whether the liquidity of some stocks is more informative for forecasting future economic development, we use the following regression model:

$$GDPGR_{t+1} = \alpha + \beta_{SB} AMIHUD_t + \beta_{OB} AMIHUD_t + \gamma CONT_t + \varepsilon_{t+1} \quad (3)$$

where β_{SB} (β_{OB}) is the coefficient estimate of stocks whose valuations tend to be subjective (objective). We divide $AMIHUD_t$ into two parts— β_{SB} and β_{OB} —to test cross-sectional differences in the predictive ability to forecast changes in economic conditions. For instance, during periods of market stress, small and risky firms are more likely to be negatively affected by a tight economy; therefore, investors prefer more liquid and safer securities (Longstaff 2004; Vayanos 2004). Given this flight to quality, the illiquidity of some stocks provides more information on future economic development.

For several reasons, we consider four aspects of a company: size, firm age, dividends, and book-to-market ratios. First, financial statements and other business information on large firms tend to be publicly available. In contrast, obtaining reliable information on small or young firms' financial soundness and productivity is often difficult, thereby making their appropriate evaluation a challenge. Furthermore, investors prefer certain returns when the economy worsens if considering the argument of Kahneman & Tversky (1997), who show that investors care more about losses rather than gains. Investors move out of non-dividend-paying and riskier stocks during times of high volatility. Firms with high book-to-market ratios are distressed stocks given their lower earnings and stock prices (Fama & French 1992); therefore, investors prefer low book-to-market stocks in turbulent times.

4. Empirical Results

Table 3 shows the regression results for the predictability of market liquidity on future economic growth using equation (2). We find that the coefficients of *dAMIHUD* are negative (–0.0060) and statistically significant, implying that the Amihud (2002) illiquidity measure is a good predictor for next quarter real GDP growth even after controlling for other control variables that affect the real economy. Turning to the control variables, *dGDP*, *TERM3*, and *CRED3* are separately included in Models (1), (2), and (3) because *dGDP* is highly correlated with *TERM3* and *CRED3*, as previously noted. We find that a positive and significant relationship exists between *TERM3* and *dGDP_F* whereas no significant relationship exists between *CRED3* and *dGDP_F*, and d*MVOL* is negatively and significantly associated with *dGDP_F*. Additionally, Table 3 provides the adjusted R-squared both with and without the liquidity measure. Adj R-squared (Ex.*AMIHUD*) is the adjusted R^2 without *AMIHUD*. When we include the liquidity variable in the estimations, the adjusted R^2 improves for Model (1) from 0.0941 to 0.1489; for Model (2) from 0.1842 to 0.2286; and for Model (3) from 0.3058 to 0.3421, respectively. This result suggests that market-level liquidity plays a role in predicting future macroeconomic fundamentals.

Table 3. Relationship between Stock Market Liquidity and Future Economic Growth

	(1)		(2)		(3)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
dAMIHUD	-0.0060**	(-2.23)	-0.0054**	(-2.04)	-0.0049**	(-2.48)
TERM3			0.2721*	(1.96)	0.2612**	(2.28)
CRED3			-0.4171	(-1.19)	-0.3077	(-1.15)
dMVOL					-0.0330**	(-2.52)
dGDP	0.2938***	(3.80)				
Constant	0.0075***	(4.01)	0.0107***	(6.79)	0.0108***	(7.03)
Adj R-squared	0.1489		0.2286		0.3421	
Adj R-squared (Ex.*AMIHUD*)	0.0941		0.1842		0.3058	
Observations	67		67		67	

This table shows the relationship between market liquidity and future economic growth in Korea from 1995:2 to 2011:4. The dependent variable is *dGDP_F*. Explanatory variables are separately included because *dGDP* is highly correlated with *TERM3* and *CRED3*. *AMIHUD* is defined as equally weighted averages of each stock's Amihud (2002) illiquidity measure by quarter. Adj R-squared (Ex.*AMIHUD*) is the adjusted R^2 without *AMIHUD*. The Newey-West corrected t-statistics with four lags are in parentheses. ∗∗∗, ∗∗, and ∗ denote significance at the 1%, 5%, and 10% levels, respectively.

As previously mentioned, one important issue in this study is to consider potential endogeneity in that economic growth and stock market liquidity may be jointly determined. Therefore, we perform Granger causality tests between *dGDP_F* and *dAMIHUD* using a vector auto regression (VAR) approach following Næs *et al.* (2011). Table 4 reports the results of the Granger causality tests and shows one-way Granger causality from *dAMIHUD* to *dGDP_F*. Specifically, the null hypothesis that *dGDP_F* does not Granger cause *dAMIHUD* cannot be rejected, whereas the null hypothesis that *dAMIHUD* does not Granger cause *dGDP_F* is rejected.

Table 4. Granger Causality Tests

Ho: *dGDP_F* ↛ *dAMIHUD*	
c^2	0.20838
p-value	0.648
Ho: *dAMIHUD* ↛ *dGDP_F*	
c^2	2.9261*
p-value	0.087

This table shows the results of the Granger causality tests between market liquidity and future GDP growth by using a vector auto regression (VAR) approach. ∗ denotes significance at the 10% level.

Some stocks are more affected by economic fluctuations given their informational opacity and high risk. Therefore, we test whether the liquidity of those vulnerable stocks has more predictive power for future economic fundamentals. Table 5 shows summary statistics for the level of liquidity based on firm characteristics. Panel A reports summary statistics for the level of liquidity by firm size. *AMH_S* is the Amihud (2002) illiquidity measure of the 25% smallest firms for the sample period and *AMH_L* is the illiquidity measure of the 25% largest firms. Similarly, *AMH_young* is *AMIHUD* of the 25% youngest firms; *AMH_nondiv* of non-dividend-paying firms; and *AMH_HBM* of firms with the 25% highest book-to-market ratios. Consistent with our conjectures, small, young, non-dividend-paying, and distressed stocks are less liquid and have higher standard deviations. These stocks are likely to be difficult to evaluate and arbitrage and, therefore, more affected by shifting investment portfolios in times of market stress.

Table 6 reports the regression results using equation (3) to test whether the liquidity of certain stocks is more informative for predicting future economic growth. We find evidence that the illiquidity of small, new, non-dividend-paying, and high book-to-market stocks have more information contents for future macroeconomic

fundamentals. To be specific, the coefficients of *dAMH_S*, *dAMH_young*, *dAMH_nondiv*, and *dAMH_HBM* are negative and statistically significant. In contrast, no significant relationship exists between relatively safe stocks (*dAMH_L*, *dAMH_old*, *dAMH_div*, and *dAMH_LBM*) and future economic development (*dGDP_F*).

Table 5. Degree of Liquidity Depending on Firm Characteristics

	Observations	Mean	Std. Dev.	Min	Max
Panel A: Size					
AMH_S	67	1.1406	2.8719	0.0402	17.9701
AMH_L	67	0.0257	0.0372	0.0007	0.1861
Panel B: Firm Age					
AMH_young	67	0.5318	1.7086	0.0058	12.7014
AMH_old	67	0.1439	0.2182	0.0206	1.5069
Panel C: Dividend					
AMH_nondiv	67	0.8058	2.1273	0.0079	13.2570
AMH_div	67	0.1454	0.1592	0.0151	0.9403
Panel D: Book-to-market Ratio					
AMH_HBM	67	0.7040	1.5721	0.0145	9.7355
AMH_LBM	67	0.1175	0.1601	0.0037	0.7641

This table shows summary statistics for the degree of liquidity depending on firm characteristics. *AMH_S* is the Amihud measure of the 25% smallest firms; *AMH_young* of the 25% youngest firms; *AMH_nondiv* of non-dividend-paying firms; and *AMH_HBM* of firms with the 25% highest book-to-market ratios.

Table 6. Cross-sectional Differences in Information Content for Future Economic Growth

Panel A: Size								
Dependent Variable	*dAMH_S*	*dAMH_L*	*TERM3*	*CRED3*	*dMVOL*	*Constant*	Adj. R^2	Obs.
dGDP_F	-0.0056***	-0.0026	0.2571**	-0.2959	-0.0308**	0.0105***	0.3790	67
	(-3.08)	(-1.56)	(2.21)	(-1.10)	(-2.48)	(6.70)		
Panel B: Firm Age								
Dependent Variable	*dAMH_young*	*dAMH_old*	*TERM3*	*CRED3*	*dMVOL*	*Constant*	Adj. R^2	Obs.
dGDP_F	-0.0110***	0.0034	0.3301***	-0.2889	-0.0305***	0.0108***	0.4344	67
	(-3.00)	(1.17)	(3.53)	(-1.46)	(-3.18)	(7.74)		
Panel C: Dividend								
Dependent Variable	*dAMH_nondiv*	*dAMH_div*	*TERM3*	*CRED3*	*dMVOL*	*Constant*	Adj. R^2	Obs.
dGDP_F	-0.0052**	-0.0013	0.2671**	-0.3101	-0.0308**	0.0107***	0.3617	67
	(-2.44)	(-0.73)	(2.55)	(-1.16)	(-2.51)	(7.01)		
Panel D: Book-to-market Ratio								
Dependent Variable	*dAMH_HBM*	*dAMH_LBM*	*TERM3*	*CRED3*	*dMVOL*	*Constant*	Adj. R^2	Obs.
dGDP_F	-0.0056*	-0.0020	0.2400**	-0.3312	-0.0304**	0.0106***	0.3541	67
	(-1.94)	(-1.16)	(2.29)	(-1.30)	(-2.25)	(6.77)		

This table shows the regression results for the test of whether small, young, non-dividend paying, and distressed stocks are more informative for predicting future economic growth. *dAMH_S* is the seasonally adjusted *AMIHUD* of the 25% smallest firms; *dAMH_young* of the 25% youngest firms; *dAMH_nondiv* of non-dividend-paying firms; and *dAMH_HBM* of firms with the 25% highest book-to-market ratios. The Newey-West corrected t-statistics with four lags are in parentheses. ∗∗∗, ∗∗, and ∗ denote significance at the 1%, 5%, and 10% levels, respectively.

5. Conclusion

The 2008 financial crisis underscores the importance of liquidity as a precursor of changes in macroeconomic

fundamentals. In this regard, we examine whether the Korean stock market liquidity predicts future economic development over the period 1995:2–2011:4. We find that stock market liquidity, proxied by the Amihud (2002) illiquidity measure, is strongly correlated with future economic development. In addition, we investigate how cross-sectional differences in stocks' liquidity depending on firm characteristics affect the business cycle. We hypothesize that the liquidity of riskier stocks is more informative about the state of the economy. Consistent with this conjecture, we find evidence that the liquidity of small, new, non-dividend-paying, and high book-to-market stocks has greater predictive power.

Our findings have important policy implications in that market liquidity has an effect on the real economy and, furthermore, that the information content of liquidity varies across stocks. First, enhancing the stock market's resilience to shocks by reducing the information asymmetry between investors and firms contributes to the stability of the real economy. Second, improving transparency in the business environment leads to a more liquid market that, in turn, contributes to the growth of the economy. Finally, similar to liquidity standards of micro-level liquidity (e.g., the liquidity coverage ratio and the net stable funding ratio), regulation or supervision of market-level liquidity to keep the market stable should be considered to avoid sudden liquidity dry-ups.

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