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RESEARCH ARTICLE

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Institutional Investors, Earnings Quality and Asset Liquidity: Evidence from China's Stock Market

Abstract This paper investigates how institutional holding and earnings quality influence the liquidity of assets. Contrary to findings in developed markets, we document several novel results in China's stock market: (1) institutional holding negatively affects assets' liquidity, (2) earnings quality is negatively related with liquidity. Since earnings quality captures asymmetric information, low earnings quality induces high divergence in investor opinions and thus boosts market trading, and (3) interestingly, the effect of earnings quality on liquidity is greater if institutional investors' holding is at a high level. Overall, our findings cast doubt on the conventional wisdom that institutional investors and earnings quality improve market liquidity. The results are robust to different measures and alternative model specifications.

Keywords institutional holding, earnings quality, liquidity, China's stock market, emerging stock market

1 Introduction

Liquidity is the essential issue of financial theory and practice. Numerous studies

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focusing on asset liquidity find that average liquidity is priced (Amihud & Mendelson, 1986; Brennan & Subrahmanyam, 1996; Datar, Naik, & Radcliffe, 1998; Chordia et al., 2001; Chordia, Huh, & Subrahmanyam, 2009). Amihud (2002) points out that liquidity also predicts future returns, and that liquidity shocks are positively correlated with return shocks. Recently, Acharya and Pedersen (2005) develop a model that leads to three different risk premia associated with changes in liquidity and find these risk premia significantly priced. Bekaert, Harvey, and Lundblad (2007) offer a comprehensive review on vast empirical and theoretical studies on the literature of liquidity. Despite extensive related research, most examine liquidity primarily based in the United States. In contrast, this research focuses on the emerging market, where liquidity effects may be particularly strong (Bekaert et al., 2007).

Recently, relations among institutional investor, earnings quality and market liquidity are of considerable interest to managers, regulators, and researchers. While liquidity is an important issue, it is not clear whether institutional holding and earnings quality should affect it.

On the one hand, institutional investors clearly play a vital role and become increasingly important in financial market. For example, Stein (2009, p. 1517) points out that "direct individual ownership of U.S. equities, which was 47.9% in 1980, fell to 21.5% by 2007." In China's stock market, although institutional accounts comprise less than 1% of total investor accounts, institutional trading accounts for a substantial proportion of total trading volume. By the end of 2008, the market value held by the institutional investors was around 54.62% of the total market capitalization of the floating shares. As for the institutional holding, by the end of 2005–2008, it was 69.87%, 57.47%, and 51.29%, respectively.[1]

Given their large scale, institution investors have an inherent advantage in processing market information, and thus are better informed than other investors. Their information advantage can therefore affect liquidity. Furthermore, by diversifying liquidity of individual asset, institution investors can enhance overall liquidity and reduce variation of liquidity over time. Lakonishok, Shleifer, and Vishny (1992) point out that institutional investors' buying of undervalued stocks and throwing of overvalued stocks will result in a reasonable price, and then increase stocks' liquidity. However, a concern is raised that the herding behavior exhibited by institutions, acts as a force that destabilizes markets by aggravating volatility and reduces the asset liquidity (Friedman, 1996; Wermers, 1999). Malkiel and Xu (2002) attribute the increasing volatility in financial markets over time to an increase in institutional ownership.

On the other hand, due to frequent accounting and financial frauds in recent

[1] See *China Securities Registration and Settlement Statistical Yearbook* (2007 and 2008). The Chinese version of these files can be got at http://www.chinaclear.cn/main/03/0305/0305_1.html

years, earnings quality has attracted much attention from scholars. Numerous studies confirm that earnings quality has a significant effect on asset liquidity. For example, Heflin, Shaw, Wild (2005) use an effective bid-ask spread and depth of liquidity as alternative variables for liquidity and find that higher quality of information disclosure will result in greater liquidity of stocks. Chung, Sheu, and Wang (2009) point out higher earnings management will lead to lower liquidity of stocks. Bhattacharya, Desai, and Venkataraman (2011) suggest that lower earnings quality will increase adverse selection risk and reduce stock liquidity.

Although many prior studies focus on the impacts of earnings quality or institutional investor on liquidity, few take into account of how the interaction between earnings quality and institutional investors affects the liquidity. Indeed, there are studies showing that institutional investors and earnings quality will influence each other. Bushee and Noe (2000) suggest the higher information disclosure corresponds to higher institutional ownership. Mitra and Cready (2005) unveil a negative correlation between institutional ownership and discretionary accruals after controlling firm size and information environment.

To fill the gap, this paper studies the impact of earnings quality, institutional investor, and their interactive effects on asset liquidity, and we take this as our first contribution. We emphasize this contribution in three ways. First, while the relationship between institutional investor and liquidity is important, it is not clear whether institutional investors should affect the kind of relationship. Actually, prior studies only offer mixed results (Section 2.1 discusses this point in detail). Second, regarding the relationship between earning quality and liquidity, to our best knowledge, there are only two papers related to this issue and both focus on the developed stock markets. Last, despite the fact that there are a large number of papers concerning the relationship between institutional investors and their monitor role, we are aware that there is no further study examining the effect between interaction of institutional investor and earnings quality on asset liquidity.

Our second contribution is, using the data from China's stock market (a typical emerging market), to provide important out-of-sample evidence for prior studies. Most studies (e.g., Amihud & Mendelson, 1986; Chordia, Huh, & Subrahmanyam, 2009; Sadka, 2006) have demonstrated that liquidity plays an important role in asset pricing, such as its predictability on future return and return shocks. However, (1) the relations among institutional investors, earnings quality and liquidity in emerging market are largely overlooked, and (2) as Bekaert, Harvey, and Lunblad (2007) point out, in an emerging market, the diversification of ownership structure and stock portfolio is not enough to mitigate the liquidity effects, and local market liquidity is an important driver of expected returns. Therefore, using the most typical emerging stock market,

China's stock market, we conduct our empirical test which can provide meaningful out-of-sample implications to the liquidity theory.

Our main findings can be summarized as: (1) institutional investors' holding negatively affects assets liquidity; (2) earnings quality is negatively related to liquidity; and (3) the effect of earnings quality on liquidity is greater if the institutional investor holding is at a high level. These findings have important implications for both academics and practitioners. The results provide out-of-sample evidence on the relationship between institutional investor and liquidity, and cast doubt on the conventional wisdom in the west that institutional and earnings quality improve market liquidity. This causes us to find the different economic background and mechanism in a typical emerging market. And from the perspective of investor behavior, we offer a reasonable explanation to our findings, which may be helpful for the regulators to release related rules or laws for enhancing the market liquidity.

The rest of the paper is organized as follows. Section 2 develops testable hypotheses. Section 3 describes the sample and defines the variables. Section 4 presents and analyzes the empirical results. And the last section provides conclusions.

2 Hypothesis Development

In this section, we develop the hypotheses from the following three aspects:

2.1 Institutional Investors and Liquidity

Since that institutional investors often take large positions relative to the positions held by the individual investors, a growing body of studies point out that institutional investors' behaviors can significantly influence market liquidity. Even in the absence of other transaction costs, some markets may not be liquid from their perspective. Meanwhile, institutions also have an inherent advantage to produce and process information, and thus are better informed than other investors. Obviously, with this information advantage, institutional investors could affect liquidity by their informed trades.

While the relationship between institutional and liquidity is important, it is not clear whether institutional investors should affect the relationship. Many empirical studies on institutional investors and liquidity only find mixed results. For example, Sarin, Shastri, and Shastri (2000) find that higher fractional ownership of stocks by institutions decreases the liquidity and reduces quoted depth after controlling for the endogeneity between ownership and liquidity. However, Dennis and Weston (2001) find that liquidity increases with increases in institutional ownership. Recently, Rubin (2007) found that liquidity increases with

the holding of institutional investors, due to higher trading activity, and decreases with institutions' block holdings due to higher adverse selection (Agarwal, 2010).

Most papers investigate the effect of informed traders on liquidity. For example, Glosten and Milgrom (1985) and Easley and O'Hara (1987) indicate that firms with a higher fraction of informed traders will have higher spreads. Given that the institutions have an information advantage with respect to producing and processing information compared to the individuals, we argue that 1) institutional investors may focus more on the fundamental of firms and trade in a long-term perspective, and 2) the information advantage of institutional investors could potentially decrease the trading incentives of individual investors. In addition, institutions also behave herdingly (i.e., they trade in the same direction) and this will force other types of investors to rebalance more position to meet the demand (or price impact) of institutional investors. As a result, this will induce a higher spreads or trading costs with an increase in institutional investors. We thus propose:

Hypothesis 1 (H1): Ceteris paribus, firms with greater institutional holdings will have lower liquidity.

2.2 Earnings Quality and Liquidity

Even though earnings quality has attracted much attention of scholars recently, most related studies focus on the accounting point of view. Several studies have shown that earnings quality has a significant effect on asset liquidity.

To the best of our knowledge, there are only two papers directly related to our research. Specifically, Chung, Sheu, and Wang (2009) point out that higher earnings management will lead to lower liquidity of stocks. Bhattacharya, Desai, and Venkataraman (2011) suggest that lower earnings quality will increase adverse selection risk and reduce stock liquidity. Both show that higher earnings quality will result in greater liquidity of stock.

We argue the effects of *EQ* on liquidity are along two aspects. First, as argued by Chung, Sheu, and Wang (2009), the low earnings quality of corporate accounting information may well lead to an increase in the proportion of informed traders in the firm's equity, along with a corresponding decline in the willingness of uninformed traders (liquidity traders) to trade in such stocks. In addition, firm managers may conduct aggressive *EQ* for their own private benefits. If liquidity traders recognize the adverse selection costs involved in *EQ*, they will try to avoid trading the corresponding firm's stocks.

Second, as Hong and Stein (2007) point out, the divergence between investors causes the stock's high volume and liquidity. With a low level of earnings quality, investors investing on the specific firms will face a low standard of disclosed earnings information, and it is more likely to cause different investors to make

different investment decisions based on the accounting earnings information.

As a result, we propose the following null hypothesis following Chung, Sheu, & Wang (2009), which is contrary to Hong & Stein (2007).

Hypothesis 2 (H2): Ceteris paribus, firms with greater earnings quality will have higher liquidity.

2.3 Institutional Investors, Earnings Quality and Liquidity

Given the scale of the investments and the monitor role of institutional investors on a firm's operation, it is natural to expect that institutional investors are likely to actively manage their investment. In fact, lots of prior researchers find evidence consistent with the role of institutional investors in corporate governance by showing evidence of the effect of monitor on firm operation and earnings quality.

Institutional investors have at least two incentives to monitor a firm's operation and accounting information. First, as an important source of information about the firm, financial statements are particularly of interest to institutional investors. Institutional investors typically use all kinds of relevant information to plan and evaluate their investments. Actually, empirical evidence continues to document that there are significant market reactions to earnings announcements, and we can conclude that earnings provide useful information from the asset-pricing point of view.

Second, institutional investors are also capable of analyzing financial statements more thoroughly and proficiently than individual investors. For example, Hand (1990) finds that sophisticated investors interpret more accurately information in earnings announcements. Bartov, Radhakishnan, and Krinsky (2000) find that the pattern of post-earnings announcement (PEAD) is reduced as the level of institutional investment increases.

Therefore, if institutions are better monitors than individuals and institutions do tend to hold the stocks with high earnings quality, we would expect that, based on the H1 and H2, the effect of earnings quality on liquidity increase with increases in the level of institutional ownership. Based on this argument, we make a further study based on the existing literature by examining the effect of interaction of institutional investor and earnings quality on asset liquidity. We present the following hypothesis to summarize our logic.

Hypothesis 3 (H3): Ceteris paribus, the effect of earnings quality on liquidity is greater if the institutional investor holding is at a high level.

3 Sample and Data

Our sample consists of annual observations from 2003 to 2009 for all China's listed firms. We obtain our data and variables from the CCER Database, a widely

used database for research of China's listed firms. The sample period starts from 2003 because the observation of mutual funds in China only achieved a certain extent from 2003[2], and we need mutual funds' portfolios to compute the variable of institutional investors' holding. Firms in the financial sector and special treatment firms are excluded[3]. Finally, we have 4,852 firm-year observations.

Since we aim to study earnings quality and institutional holdings' impacts on stock liquidity, therefore, our key variables in this paper are: liquidity (*LIQ*), earnings quality (*EQ*), and institutional holdings (*IO*). We also control several other related factors.

As for liquidity measures, according to Wang and Kong (2010), in China's stock market, turnover is the best proxy for liquidity, compared with a lot of alternative variables (e.g., *Amihud measure, Amivest measure, Pastor-Stambaugh measure, Dollar volume, Quoted Spread Effective, Spread Intra-day Price Impact Coefficient, Inter-day Impact Coefficient, and Hasbrouck measure*). We thus take *Turnover* as our main variable to measure liquidity, as Tang and Wang (2011) did in testing the relationship between corporate governance and liquidity in China's stock market.

For the robustness of our tests, we also use *Amivest* as a second proxy variable for liquidity. In particular, we compute *Amivest* as follows,

$$Amivest_{i,t} = \frac{1}{D_{i,t}}\left(\sum_{d=1}^{D_{i,t}} \left|R_{i,t,d}\right|^{-1} \times DOLVOL_{i,t,d} \times 10^{-6}\right)^{\frac{1}{2}}, \quad (1)$$

where, $R_{i,t,d}$ and $DOLVOL_{i,t,d}$ are the daily return and trading volume in dollar of stock i at day d of year t; $D_{i,t}$ is the trading days of stock i in year t.

The logic behind equation (1) is straightforward: for stocks with high liquidity, trading impacts from large trading volume only induce small price changes. Cooper, Groth, and Avera (1985), Amihud, Mendelson, and Uno (1997) and Berkman and Eleswarapu (1998) use this measure to describe liquidity. To estimate the *Amivest*, we follow Hasbrouck (2005) by adopting the square root of *Amivest* to conduct our tests. In addition, since *Amivest* measurement often incurs outliers in the sample distribution, we follow Cooper, Groth, and Avera (1985) and Amihud, Mendelson, and Lauterbach (1997) by using its logarithmic form.

To obtain the proxy for earnings quality (*EQ*), we follow Ball and Shivakumar (2005) and Wang (2006) in estimating the relationship between operating cash flows and accruals with a piecewise nonlinear model. Specifically, our model is

[2] In 2002, there were only 33 mutual funds in China's stock market, but by 2003, the number jumped to 99. As a result, we begin our sample from 2003.

[3] China has an investor warning system. If a firm has negative net incomes for two consecutive financial years, the China Securities Regulatory Commission (CSRC) gives a special treatment (ST) to the shares of the firm. If a firm has consecutive losses for three years, it will be further classified as a ST* firm. The ST* firm has to face the delisting risk if it continues to lose money.

as follows[4],

$$ACC_t = \beta_0 + \beta_1 CFO_{t-1} + \beta_2 CFO_t + \beta_3 CFO_{t+1} + \beta_4 DCF_t + \beta_5 \left(DCF_t \times CFO_t \right) + \varepsilon_t, \quad (2)$$

where, ACC_t is total accruals at t, and scaled by average total assets at t; total accruals are earnings minus operating cash flows; CFO_t is operating cash flows at t, and scaled by average total assets at t; CFO_{t-1} is operating cash flows at $t-1$, and scaled by average total assets at t; CFO_{t+1} is operating cash flows at $t+1$, and scaled by average total assets at t; DCF_t is one if the change in cash flows at t is less than zero ($CFO_t - CFO_{t-1} < 0$), and zero otherwise. We then use the absolute value of residual in this equation, $|\varepsilon_t|$ (i.e., abnormal accrual), as the proxy for earnings quality. The larger the *EQ* (i.e., the absolute value of residual) is, the lower the earnings quality will be.

We define institutional investors' ownership (*IO*) as a percentage of the total outstanding tradable shares of all the open ended and close ended funds at *t*.

To control other factors potentially affecting our concerned relationship, we also include several control variables as follows: Ln(*Size*), defined as natural log of total assets at *t*; Ln(*B/M*), defined as book value to market value ratio at *t*; Ln(*Price*), defined as natural log of average stock price at *t*; and we also control the year and industry fixed effects in empirical tests.

4 Data Analysis

4.1 Basic Results

Table 1 presents descriptive statistics. The average *Turnover* is 2.6% and ranges from 0.04% to 16.0%. On average, *Amivest* is 3.72 with a standard deviation of 2.78. The abnormal accrual (*EQ*) is 0.038 with a standard deviation of 0.043. Institutional holdings range from 0 to 0.757. Overall, the summary statistics suggests all our variables varying with different observations.

To investigate how earnings quality, institutional holding and their interaction item affect market liquidity, we employ the following empirical model:

$$LIQ = \alpha + \beta_1 EQ + \beta_2 IO + \beta_3 IO \times EQ + \sum_j \delta_j ControlVariables_j + IndustryDummy + YearDummy + \varepsilon. \quad (3)$$

[4] Actually, earnings management and earnings quality are correlated in the accounting literature. There are many measures of earnings management and earnings quality (e.g., Jones, 1991; Dechow & Dichev, 2002; Ball & Shivakumar, 2005) with different dimensions. Recently, most papers on earnings quality include the factors used to estimate earnings management. For example, Lo (2008) discusses the relationship between earnings management and earnings quality in detail.

Table 1 Descriptive Statistics

Variables	*Turnover*	*Amivest*	*EQ*	*IO*	Ln(*Size*)	Ln(*B/M*)	Ln(*Price*)
Panel A: Summary Statistics							
Obs	4,852	4,852	4,852	4,852	4,852	4,852	4,852
Mean	0.026	3.720	0.038	0.049	20.72	–0.622	1.985
Std.Dev.	0.018	2.783	0.043	0.101	1.098	0.423	0.595
Min	0.0004	0.364	0	0	18.28	–2.776	0.560
Max	0.160	32.436	0.523	0.757	25.86	0.295	5.015
Panel B: Correlation							
Amivest	0.471						
EQ	0.097	0.120					
IO	–0.170	0.128	0.092				
Ln(*Size*)	0.261	0.857	0.085	0.309			
Ln(*BM*)	–0.396	–0.409	–0.227	–0.176	–0.388		
Ln(*Price*)	0.238	0.593	0.154	0.311	0.593	–0.542	1.000

Note: This table reports descriptive statistics of our sample. *Turnover* and *Amivest* are liquidity measures. *EQ* measures earnings quality. *IO* is institutional investors holding. Ln(*Size*), Ln(*B/M*), and Ln(*Price*) is the natural logarithmic value of outstanding shares, book-to-market value, and trading price, respectively. All our variables are calculated in the firm-year level.

Here, we define *IndustryDummy* following industry classification standard of China securities regulatory commission (CSRC). Namely, we define 12 industry dummy variables to indicate the 13 first-level industries. The definition of *YearDummy* is based on the sample period (i.e., we use 4 dummy variables to denote the 5 years from 2004 to 2008).

Table 2 shows our regression results. Models 1 and 2 present the estimation when we take *Turnover* as liquidity measure. In Model 1, we examine separate effects of earnings quality (*EQ*) and institutional ownership (*IO*) on asset liquidity. The coefficient of *IO* is negative with 1% significance level, which suggests that firms with lower institutional holding have higher liquidity. Given the institutional preference with long-term investment, which implies a low level trading or transactions, and a negative relationship is reasonable. Our result is consistent with Gillan and Starks (2000), which points out that the annual liquidity of CalPERS (California Public Employee Retirement System) and the New York Retirement funds is only about 10% and 7%, respectively. The low liquidity implies that instructional investors may have incentives to hold the shares and actively encourage managers to improve performance and increase shareholder value.

As for the estimation of *Model-2* in Table 2, we further introduce the interaction

item of *IO*EQ* as a right-hand variable to examine the impact of interaction item of earnings quality and institutional investors on liquidity. Even though there is no significant effect of *EQ* on liquidity, interestingly, the coefficient of *IO*EQ* is –0.195 (with *p-value* less than 0.01), which suggests, when controlling for institutional holding, the earnings quality has significantly positive influences on liquidity.

Table 2 Empirical Results

	Turnover as liquidity		Amivest as liquidity	
	Model-1	Model-2	Model-3	Model-4
Intercept	–0.044***	–0.044***	–39.848***	–39.848***
	(–8.23)	(–8.24)	(–88.30)	(–88.35)
EQ	0.002	0.0081	1.951***	2.337***
	(0.45)	(1.44)	(4.34)	(4.92)
IO	–0.054***	–0.046***	–4.882***	–4.363***
	(–22.61)	(–13.44)	(–24.15)	(–14.96)
*IO*EQ*		–0.195***		–13.161**
		(–3.10)		(–2.47)
Ln(*Size*)	0.004***	0.004***	2.058***	2.057***
	(13.76)	(13.72)	(92.00)	(91.99)
Ln(*B/M*)	–0.016***	–0.016***	–0.298***	–0.299***
	(–24.51)	(–24.56)	(–5.43)	(–5.46)
Ln(*Price*)	–0.000	0.000	0.652***	0.656***
	(–0.11)	(0.01)	(14.54)	(14.63)
Year fixed effect	Control	Control	Control	Control
Industry fixed effect	Control	Control	Control	Control
Adj-R^2	0.265***	0.266***	0.775***	0.775***
F-stat	117.6***	111.1***	1112.8***	1044.7***

Note: This table reports regression results by equation (3). *Turnover* and *Amivest* are liquidity measures. *EQ* measures earnings quality. *IO* is institutional investors holding. Ln(*Size*), Ln(*B/M*), *and* Ln(*Price*) are the natural logarithmic value of outstanding shares, book-to-market value, and trading price, respectively. All our variables are calculated in the firm-year level. The industry and year fixed effect are controlled in regressions. Model-1 and Model-2 take the *Turnover* as Liquidity and Model-3 and Model-4 take the *Amivest* as Liquidity. Adj-R^2 is the adjusted *R*-squared. *F*-stat is the model significance. Robust *p*-values are in parentheses.

* indictes significant at the 10% level; ** indicates significant at the 5% level; *** indicates significant at the 1% level.

Hence, in China's stock market, the positive impact of institutional investors on liquidity only takes place in the margin of the high-level earnings quality. The earnings quality shows a similar pattern with findings in western countries, i.e., a higher quality of earnings quality will result in greater liquidity of stocks (e.g., Heflin, Shaw, & Wild, 2005; Chung, Sheu, & Wang, 2009; Bhattacharya, Desai, & Venkataraman, 2011).

Model 3 and 4 in Table 2 reports estimated results when taking *Amivest* as liquidity measure. Overall, we get similar results. As for the effect of institutional investor, we get the same pattern as that of liquidity measured by *Turnover*. Thus, our result provides robust out-of-sample evidence for the debate of relations between institutional investor and liquidity.

EQ keeps its sign in positive but turns to significant now. Coefficients of *EQ* in Model 3 and 4 are around 2.0 with significant *p*-values less than 0.01, which indicates that firms with low earnings quality are more likely to have high liquidity. This is consistent with Hong and Stein's study (2007), in which they argue divergence between investors causes the stock's high volume and liquidity.

Model 4 includes the interaction item, *IO*EQ*, as an independent variable. The coefficient is –13.16 with *p*-value less than 0.01. Our results here suggest that the effect of earnings quality on liquidity is greater if the institutional investor holding is at a high level, which implies that there is a nonlinear effect between earnings quality and liquidity conditional on the institutional participation.[5]

We offer one feasible explanation to our findings from the perspective of investor behavior, which lies in individual investors' speculation and institutional investors' long-term investment. Indeed, the turnover in China's stock market is very high. All the annual turnovers in our sample period are over 500%, which is even higher than the 365% turnover of DotCom firms in their heyday (Ofek & Richardson, 2003). It is hard to explain the heavy turnover rate in China's stock market in light of the conventional financial theory, especially given the high transaction cost in China's stock markets (Yu & Xiong. 2011). In our sample period, each side of a trade has to pay a 0.1% or 0.3% stamp tax and a 0.4% commission fee, and this will directly cause any trade round incurring a fee no less than 1.0% of the proceeds. To explain these facts in China's stock market, Yu and Xiong (2011) point out that one potential reason is speculation or gambling.

Based on the above arguments, a reasonable conjecture is that earnings quality captures asymmetric information (e.g., Bhattacharya, Desai, &Venkataraman, 2011), and low earnings quality induces high investor opinion divergences, since

[5] Actually, using the mean value of institutional holding, we can easily to calculate the marginal effect of earnings quality under the specification of our empirical model, i.e., 2.337–13.161*0.049 = 1.692. Therefore, if there is one unit decrease for EQ (i.e., the earning quality increase one unit), the liquidity will decrease 1.692 units. This marginal effect means that institutional holding counteracts the negative impact of earnings quality on liquidity.

individual investors fail to accurately identify firms' real earnings information or just speculate/gamble in the stock market. (e.g., Hong & Stein, 2007; Kumar, 2009). Finally, this boosts market trading and increases liquidity. Meanwhile, since institutional investors tend to hold stock in the long-term, their behaviors will accordingly decrease the trading and transaction. Thus, institutional investors have a negative effect on liquidity.

To check the robustness of our results, we conduct three empirical tests in this section: using an alternative industry classification standard, controlling for the potential endogenous issue in the regression, and splitting our sample into different sub-periods. Collectively, we find our results are all robust to different measure estimations and alternative model specifications.

4.2 Alternative Industry Classification Standard

In our main test, based on the industry classification standard of CSRC, we estimate the earnings quality (in equation 2) and control the industry effect (in equation 3). In a robustness test, we adopt the global industry classification standard (GICS), which is an industry taxonomy developed by Morgan Stanley Capital International (MSCI) and Standard & Poor's, to re-test our empirical model. *Robust-1* in Table 3 shows results based on GICS, and it is easily to find that our results show the similar pattern with Table 2.

4.3 Endogenous Issue

Our empirical test shows that institutional investors' behaviors can affect the asset liquidity significantly. One more concern for our empirical test is the asset liquidity may potentially affect the investment decision of institutional investors at the same time. However, we have several reasons to argue that the endogenous should not be a serious problem in our study. First, Kothare (1997), Amihud, Mendelson, and Uno (1999), Chiang and Venkatesh (1988), and Heflin and Shaw (2000) find that liquidity improves with dispersion of ownership, the fraction of insider holdings, or the block shareholder ownership. All of these authors conclude that the presence of block shareholders reduces liquidity but does not find support that liquidity plays a significant role in determining block holdings.

Second, many prior studies, such as Falkenstein (1996), Gompers and Metrick (2001), and Bennett, Sias, and Starks (2003), use cross-sectional analysis to show institutional preference for large liquid stocks and all of them treat liquidity as exogenous. Recently, Agarwal (2010) also suggests that liquidity is a persistent characteristic and institutional ownership Granger causes stock liquidity. Agarwal investigates this kind of causality in the time series context related to institutional preference for liquid stocks by exploring the inter-temporal association between

Table 3 The Basic Robust Tests

Variables	Panel A: Turnover as liquidity			Panel B: Amivest as liquidity		
	Robust-1	Robust-2	Robust-3	Robust-1	Robust-2	Robust-3
Intercept	–0.047***	0.015***	0.013**	–40.192***	–38.501***	–38.602***
	(–9.32)	–2.597	–2.289	(–95.08)	(–39.200)	(–39.441)
EQ	0.011*	0.010*	0.023***	3.493***	2.393***	3.474***
	–1.8	–1.666	–3.772	–6.99	–3.127	–6.157
IO	–0.049***	–0.033***	–0.006**	–4.646***	–4.139***	–3.684***
	(–14.78)	(–11.317)	(–2.440)	(–16.52)	(–14.997)	(–11.677)
*IO*EQ*	–0.151**	–0.086**	–0.121***	–9.693*	–7.737***	–8.255**
	(–2.23)	(–2.068)	(–3.208)	(–1.69)	(–2.648)	(–2.223)
Reform		0.017***	0.020***		0.395***	0.504***
		–42.026	–35.059		–9.2	–7.297
*IO*Reform*			–0.058***			–0.999**
			(–12.365)			(–2.090)
*EQ*Reform*			–0.022**			–1.565
			(–2.168)			(–1.334)
*IO*EQ*Reform*			0.130*			2.277
			–1.917			–0.422
Ln(*Size*)	0.004***	0.001	0.001	2.072***	1.980***	1.982***
	–14.07	–0.852	–0.915	–95.71	–39.511	–39.556
Ln(*B/M*)	–0.015***	–0.015***	–0.015***	–0.243***	–0.262***	–0.268***
	(–24.06)	(–21.734)	(–22.433)	(–4.55)	(–3.542)	(–3.611)
Ln(*Price*)	–0.001	–0.001	–0.001	0.641***	0.634***	0.636***
	(–0.34)	(–1.614)	(–1.549)	–14.74	–11.495	–11.551
Year fixed effect	*Control*	*Control*	*Control*	*Control*	*Control*	*Control*
Industry fixed effect	*Control*	*Control*	*Control*	*Control*	*Control*	*Control*
Obs.	4,778	4,778	4,778	4,778	4,778	4,778
Adj-R^2	0.259***	0.42	0.439	0.782***	0.78	0.78
F-stat	98.8***	203.4***	196.1***	1002.9***	408.8***	367.6***

Note: This table reports robust regression results. *Turnover* and *Amivest* are liquidity measures. *EQ* measures earnings quality. *IO* is institutional investors holding. Ln(*Size*), Ln(*B/M*), *and* Ln(*Price*) are the natural logarithmic value of outstanding shares, book-to-market value, and trading price, respectively. All our variables are calculated in the firm-year level. The industry and year fixed effect are controlled in regressions. Panel A takes the *Turnover* as Liquidity and Panel B takes the *Amivest* as Liquidity. Robust-1, Robust-2, and Robust-3 report results controlling for alternative industry classification standard, endogenous issue, and split share structure reform, respectively. Adj-R^2 is the adjusted R^2. *F*-stat is the model significance. Robust *t*-values are in parentheses.

liquidity and institutions' holding. Of course, we have to admit that the causality test is hard to conduct in China's stock market with the limitation of short stock market history.

To address this endogenous issue, we introduce several instrument variables and use the two-stage OLS (2SLS) to re-estimate our empirical model. Following Nas (2004) and Rubin (2007), we use instrument variables such as price volatility, yearly buy-and-holding return, leverage, firm's age, and industry classification. Specifically, our empirical model in stage-1 is as follows,

$$IO = a + b_1 Vola + b_2 YearBHR + b_3 Leverge + b_4 Age + IndustryDummy + e. \quad (4)$$

Using equation 4, we get the fitted *IO*. Then, we introduce the fitted *IO* into equation 3 to conduct the stage-2 regression.

Robust-2 in Table 3 shows estimation addressing the endogenous problem, and we can find that our results still remain robust.

4.4 Split Share Structure Reform

China's two stock exchanges are characterized by a split share structure after their establishment in the 1990s. Two-thirds of the listed shares were not tradable, and were held by the state and legal persons.

In April 2005, the Chinese government initiated a reform of the split share structure aiming to convert all non-tradable shares (NTS) into tradable shares (TS). Li et al. (2011) conclude several reasons for this reform. First, there was a severe incentive conflict between the TS holders and the NTS holders. Second, the typically small public outstanding shares on the stock market cause severe market manipulation and insider trading. Third, the predominance of NTS makes the market for corporate control almost dormant, further entrenching incompetent corporate managers (Firth, Lin, & Zhou, 2010).

A significant effect of this split share structure reform enhances the fraction of float shares in China's stock market and this reform surely affects the asset liquidity. To control this issue, we introduce a dummy variable, *Reform*, into empirical model (equation 3). Where, *Reform* takes zero if observations before the firm's reform date, and takes zero otherwise.

Robust-3 in Table 3 shows estimation controlling for the split share structure reform event. Again, our results are robust.

4.5 Dechow and Dichev (2002) and McNichols (2002) Models

We thus get our main results based on the abnormal accrual measure of Ball and Shivakumar (2005) and Wang (2006). To show our results are robust on different earnings quality measures, we employ Dechow and Dichev (2002) and McNichols

(2002) models to conduct additional tests.

The Dechow and Dichev (2002) is as follows,

$$ACC_{i,t} = \alpha + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} + \varepsilon_{i,t}, \quad (5)$$

where, ACC_t is total accruals at t, and scaled by average total assets at t; total accruals are earnings minus operating cash flows; CFO_t is operating cash flows at t, and scaled by average total assets at t; CFO_{t-1} is operating cash flows at $t-1$, and scaled by average total assets at t; CFO_{t+1} is operating cash flows at $t+1$, and scaled by average total assets at t.

To follow the McNichols (2002) model, we use the following estimation model:

$$ACC_{i,t} = \alpha + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} + \beta_4 \Delta REV_{i,t} + \beta_5 PPE_{i,t} + \varepsilon_{i,t}. \quad (6)$$

McNichols (2002) model is based on the Dechow and Dichev (2002) model but add two new variables: $\Delta REV_{i,t}$ and $PPE_{i,t}$. $\Delta REV_{i,t}$ is the change in sales deflated by beginning total assets and PPE is property, plant, and equipment deflated by beginning total assets.

As for both of Dechow and Dichev (2002) and McNichols (2002), we use the absolute value of residual in this equation, $|\varepsilon_t|$ (i.e., abnormal accrual), as the proxy for earnings quality. The larger the *EQ* (i.e., the absolute value of residual) is, the lower earnings quality will be.

Results in Table 4 and Table 5 show that estimation still stay in robustness. Since that these coefficients are very similar with those in Table 2, we omit corresponding analysis to save the space.

Table 4 Robust Tests: *EQ* of Dechow and Dichev (2002)

	Turnover as liquidity			Amivest as liquidity		
	Robust-1	Robust-2	Robust-3	Robust-1	Robust-2	Robust-3
Intercept	–0.046***	–0.104***	–0.106***	–39.980***	–47.591***	–47.718***
	(–8.543)	(–21.531)	(–21.957)	(–88.726)	(–131.203)	(–131.607)
EQ	0.017***	0.015***	0.015***	3.376***	2.515***	2.536***
	(3.072)	(2.649)	(2.715)	(7.250)	(5.912)	(5.978)
IO	–0.049***	–0.225***	–0.227***	–4.387***	–23.271***	–23.414***
	(–14.302)	(–40.491)	(–40.936)	(–15.010)	(–55.870)	(–56.242)
*IO*EQ*	–0.099**	–0.261***	–0.275***	–10.639***	–16.573***	–17.501***
	(–2.183)	(–4.146)	(–4.382)	(–2.765)	(–3.514)	(–3.718)
Ln(*Size*)	0.004***	0.006***	0.006***	2.061***	2.408***	2.408***
	(13.893)	(26.314)	(26.390)	(91.948)	(134.172)	(134.535)
Ln(*B/M*)	–0.016***	–0.017***	–0.016***	–0.260***	–0.282***	–0.269***
	(–23.719)	(–28.671)	(–28.386)	(–4.663)	(–6.516)	(–6.223)

(*To be Continued*)

(*Continued*)

	Turnover as liquidity			Amivest as liquidity		
	Robust-1	Robust-2	Robust-3	Robust-1	Robust-2	Robust-3
Ln(*Price*)	–0.000	0.006***	0.007***	0.652***	1.305***	1.357***
	(–0.115)	(13.518)	(14.622)	(14.498)	(36.414)	(36.469)
Reform			0.003***			0.195***
			(5.707)			(5.023)
Year fixed effect	*Control*	*Control*	*Control*	*Control*	*Control*	*Control*
Industry fixed effect	*Control*	*Control*	*Control*	*Control*	*Control*	*Control*
Obs	4,778	4,246	4,246	4,778	4,246	4,246
Adj-R^2	0.267	0.514	0.517	0.777	0.887	0.887
F-stat	109.9***	281.5***	268.8***	1043***	2079***	1970***

Note: This table reports robust regression results. *Turnover* and *Amivest* are liquidity measures. *EQ* measures earnings quality following Dechow and Dichev (2002). *IO* is institutional investors holding. Ln(*Size*), Ln(*B/M*), *and* Ln(*Price*) are the natural logarithmic value of outstanding shares, book-to-market value, and trading price, respectively. All our variables are calculated in the firm-year level. The industry and year fixed effect are controlled in regressions. Panel A takes the *Turnover* as Liquidity and Panel B takes the *Amivest* as Liquidity. Robust-1, Robust-2, and Robust-3 report results controlling for alternative industry classification standard, endogenous issue, and split share structure reform, respectively. Adj-R^2 is the adjusted *R*-squared. *F*-stat is the model significance. Robust *t*-values are in parentheses.

Table 5 Robust Tests: *EQ* of McNichols (2002)

	Turnover as liquidity			Amivest as liquidity		
	Robust-1	Robust-2	Robust-3	Robust-1	Robust-2	Robust-3
Intercept	–0.045***	–0.104***	–0.106***	–39.969***	–47.615***	–47.744***
	(–8.492)	(–21.462)	(–21.894)	(–88.580)	(–131.239)	(–131.643)
EQ	0.009	0.004	0.005	3.214***	2.698***	2.746***
	(1.547)	(0.680)	(0.802)	(6.470)	(5.915)	(6.037)
IO	–0.047***	–0.227***	–0.229***	–4.584***	–23.537***	–23.672***
	(–13.732)	(–40.790)	(–41.227)	(–15.734)	(–56.488)	(–56.857)
*IO***EQ*	–0.153***	–0.240***	–0.257***	–7.395*	–12.643**	–13.783***
	(–3.029)	(–3.578)	(–3.846)	(–1.734)	(–2.517)	(–2.749)
Ln(*Size*)	0.004***	0.006***	0.006***	2.061***	2.410***	2.410***
	(13.885)	(26.348)	(26.426)	(91.876)	(134.362)	(134.729)
Ln(*B/M*)	–0.016***	–0.017***	–0.017***	–0.265***	–0.279***	–0.266***
	(–24.148)	(–29.068)	(–28.776)	(–4.759)	(–6.456)	(–6.158)

(*To be Continued*)

(*Continued*)

	Turnover as liquidity			Amivest as liquidity		
	Robust-1	Robust-2	Robust-3	Robust-1	Robust-2	Robust-3
Ln(*Price*)	–0.000	0.006***	0.007***	0.649***	1.298***	1.350***
	(–0.072)	(13.541)	(14.651)	(14.421)	(36.255)	(36.324)
Reform			0.003***			0.196***
			(5.733)			(5.036)
Year fixed effect	*Control*	*Control*	*Control*	*Control*	*Control*	*Control*
Industry fixed effect	*Control*	*Control*	*Control*	*Control*	*Control*	*Control*
Obs	4,778	4,246	4,246	4,778	4,246	4,246
Adj-R^2	0.267	0.514	0.518	0.777	0.887	0.888
F-stat	109.8***	281.6***	269.0***	1040***	2081***	1972***

Note: This table reports robust regression results. *Turnover* and *Amivest* are liquidity measures. *EQ* measures earnings quality following McNichols (2002). *IO* is institutional investors holding. Ln(*Size*), Ln(*B/M*), *and* Ln(*Price*) are the natural logarithmic value of outstanding shares, book-to-market value, and trading price, respectively. All our variables are calculated in the firm-year level. The industry and year fixed effect are controlled in regressions. Panel A takes the *Turnover* as Liquidity and Panel B takes the *Amivest* as Liquidity. Robust-1, Robust-2, and Robust-3 report results controlling for alternative industry classification standard, endogenous issue, and split share structure reform, respectively. Adj-R^2 is the adjusted R^2. *F*-stat is the model significance. Robust *t*-values are in parentheses.

5 Conclusion

In this study, we investigate how institutional holding and earnings quality influence the liquidity of assets. We find some interesting evidence in China's stock market, a typical emerging market, different from developed markets. Our main findings include: (1) institutional investor holding negatively affects assets' liquidity; (2) earnings quality is negatively related with liquidity; and (3) the effect of earnings quality on liquidity is greater if the institutional investor holding is at a high level. Overall, our findings cast doubt on the conventional wisdom that institutional and earnings quality improve market liquidity. We also offer a reasonable explanation for our findings from the perspective of investor behavior.

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