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Disclosure quality and market liquidity

In Partial Fulfillment of the Requirements

for the Bachelor of Science in Accounting

by

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May, 2020

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ABSTRACT

This paper investigates the relationship between the quality of information disclosure of listed companies and stock market liquidity. I employ the effective spreads and total quoted depths as proxies for market liquidity. The quality of information disclosure is measured by disclosure scores obtained from the Shenzhen Stock Exchange official website. The empirical results display that disclosure quality is inversely related to total quoted depths and that disclosure quality possesses an insignificant relationship with effective spreads. The results imply that high-quality disclosure companies may attract investors who own constraint capital or are more risk-averse. However, if the trading cost for stocks of those companies is low, market liquidity still likely improves. Another explanation is that the high cost of processing disclosure information or more negative information in high-quality disclosure persuades traders to exit the market. Thus, regulators need to enact tighter regulation of company disclosures to increase investor confidence.

Keywords: disclosure quality; market liquidity; effective spreads; total quoted depths.

JEL Classifications: G14; D25; D82.

I. INTRODUCTION

The stock market is a product of the modern market economy. The corporation first originated from the Moscow company established in the British Empire in 1553, and then quickly developed into an important model of the modern market economy of enterprise organization management and operation. The stock market developed to become an essential channel for the allocation of capital factors (Wruck and Wu 2017). The Chinese stock market first originated in June 1920. However, due to the socialist transformation and the establishment of a planned economic system, the stock market temporarily withdrew from China (Li and Li 2019). Until August 1986, after Economic Reform and open up, the opening of the Jing'an Securities Business Department, China's first securities trading counter, marked the beginning of New China's stock trading. Over the years, China's stock market has developed into the second-largest market in the world. Furthermore, the stock market plays a vital role in promoting China's economic development in terms of improving financial markets and optimizing the allocation of capital resources (Li and Li 2019).

When investors trade in the stock markets, there is a plenty of information to help them make investment decisions. In order to prevent information overloading, they will choose what they consider is useful, accurate and understandable. In China, Lu and Liu (2002) direct a research about the information demand of public investors. The conclusion manifests that public investors in China believe that the truth, timeliness, and full disclosure of the information are more critical than the comprehensibility and quantity of the information are and that their overall evaluation of the company's annual report is very deficient. When making decisions, they pay attention to the company's exogenous information and macro information rather than endogenous information.

Company disclosure conveys information that is available to everyone, including investors, creditors, and other information users. Firms make periodic and provisional reports. Periodic

reports include annual and interim reports. In terms of the provisional report, when a significant event occurs that may have a significant impact on the stock trading price of a listed company, the company shall immediately make a provisional report and explain the cause of the incident, its status quo, and possible legal consequences. The event could be significant changes in the operating policy and scope, dominant investment behavior and major property purchase decisions, and more. Nowadays, the value of disclosed information rises with the development of many aspects of society. For instance, the state of art technology makes information dissemination more timely, provides communication channels for investors, and enables management to release daily information (Healy and Palepu 2001). Over the past few years, the supervision of company disclosure has become complete and strict. For instance, both Shanghai and Shenzhen Stock Exchanges assess the quality of information disclosure of companies lists on them. Also, the Shanghai Stock Exchange (SSE) has adjusted the current regulatory model, switching from supervision by jurisdiction to by sub-sector, for information disclosure of listed companies from 2015. The supervision of disclosure by industry guides by investor demand and is a more scientific and reasonable supervision model. My research does not target any of those specific policy changes but tests the relationship between the disclosure quality of listed companies on the Shenzhen Stock Exchange (SZSE) and stock market liquidity from 2003 to 2016.

The disclosure provides investors with timely access to valuable investment information, decreases information asymmetry between informed and uninformed investors, and improves stock market liquidity (Welker 1995). However, the transparency from impairing the information asymmetry can also cause the opposite effect (Green 2007). In previous literature, researchers prove that high-quality disclosure improves stock market liquidity. In earlier studies, many researchers used only the price dimension to examine market liquidity (Welker 1995; Fishman and Hagerty 1995). However, Lee et al. (1993) and Chordia, Roll, and

Subrahmanyam (2001) underline the importance of adopting both indicators to assess liquidity. In terms of price dimension, disclosure quality inversely relates to bid-ask spreads, which has an inverse relation to market liquidity (Welker 1995; Fishman and Hagerty 1995; Brown and Hillegeist 2007). The depths are the quantity dimension and positively related to market liquidity, and the disclosure quality positively relates to depths (Sundgren, Mäki, and Somoza-López 2018). Chen (2007) states that the disclosure quality affects market liquidity mainly through spreads, but not through depths. Heflin, Shaw, and Wild (2001) even obtain an inverse relationship between market liquidity and disclosure quality. Therefore, I comprehend the necessity to use two dimensions and apply both to represent market liquidity.

In my research, the proxy of quantity is total quoted depths, and the proxy of price is effective spreads. Based on my empirical results, the relationship between total quoted depths and disclosure quality is inverse. Heflin, Shaw, and Wild (2001) offer an explanation that the companies with good disclosure quality are more likely to attract public investors who possess constraint funds. Another alternative is such investors are more risk-averse, and when traders own higher positions, the risk impact aggravates (Heflin, Shaw, and Wild 2001; Bloomfield and Wilks 2000). Both of the above two reasons lead uninformed traders to quote lower depths than informed traders, and thus, the average level of total quoted depths decrease. However, Heflin et al. (2005) claim that the lower trading costs of firms with better disclosure enable their market liquidity to improve even the quoted depths are shallow. In addition, transparency is possible to hurt liquidity because inexperienced investors sustain higher information processing costs (Green 2007). Even though all traders acquire the same information, but inexperienced traders are unable to assimilate them and then exit the market, and thus market liquidity hurt. The last possibility is that the firms with lower-quality disclosure attempt to conceal detrimental information, however other firms select to make all information public. After analyzing them, traders instead abandon to invest in firms with intact disclosure.

Furthermore, the relationship between disclosure quality and effective spreads is not significant; but the relationship is opposite, as is the case with previous literature. Even if my empirical results show that good disclosure quality leads to a reduction in quoted depths, this is not a certainty that disclosure quality impairs liquidity.

Firm managers and regulators also care about the relationship between disclosure and market liquidity (Heflin, Shaw, and Wild 2005). Enterprise executives focus much of their energy on product-related aspects such as optimizing production and expanding the market, but disclosure is an integral part of company financing. The results of the paper are not satisfactory, but they tell that although the liquidity may show a declining trend from the indicators, in essence, this may be because it attracts more limited order investors. To ensure stable financing, managers should realize the importance of balancing between disclosure and attracting investors. Furthermore, compared with the US stock market, which is the world's largest stock market, China's stock market is significantly different in terms of company listing standards, delisting mechanism, transaction regulation system, and other aspects. The differences between the two systems are related to the different functions performed by the stock market; however, they also indicate that China's stock market supervision system still needs many improvements. Regulators ought to recognize the importance of formulating and regulating disclosure rules, which improve traders' utilization of disclosure.

The remainder of the paper is organized as follows. Section II presents a brief literature review and develops the hypotheses examined in my research. Sections III explains my research methodology and each variable in detail. Section IV displays the results of my research and interprets the results. Section V draws the conclusion, states the limitation of the research, and illuminates directions for future research.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

From the previous literature, disclosure is communications and broadly contains both quantitative and qualitative information, which enables the public to predict companies' future performance (Lev 1992; Fishman and Hagerty 1989). Even though restricted by regulations, disclosures characterize different timelines, scopes, contents, and forms at the discretion of the firms (Welker 1995). From the disclosure requirements, it divides into mandatory disclosure and voluntary disclosure. Mandatory disclosure is what the company requires to be disclosed by relevant regulations, such as GAAP and IFRS. It helps resolve agency problems and therefore reduces agency costs (Mahoney, 1995). Mandatory disclosure is beneficial to uninformed investors, does not affect informed investors, and may be harmful to the companies (Fishman and Hagerty 2003). As the name suggests, voluntary disclosure is to share information about companies' own volition. There are two reasons for the company not to disclose. One is that the company has not obtained information, and the other is that the companies' information is unfavorable. The difference is that informed investors are aware of unfavorable information, but uninformed investors are not (Dye, 1998).

The cost of disclosure divides into two parts, one is the cost of obtaining and publishing the company, and the other is the cost of understanding and assimilating the information for investors. The initial cost is easy to recognize, but the second is difficult. For investors, the difficulty of processing information is uneven. For example, some investors are unable to speculate the implications of financial reports, but other experienced investors or informed investors can get them more easily. Of all the methods of acquiring information, disclosure is the costless one (Fishman and Hagerty 1989).

The disclosure amount is related to the firm size (Lang and Lundholm 1993). Large firms face more strict and public scrutiny, so disclosures they made are more detailed than smaller firms do (Alsaeed 2006). Also, disclosing more information enables them to attract significant

positions from institutional investors, who would provide low-cost capital. Thus, the disclosure policies employed by the larger firms decrease the information asymmetry and improve the liquidity (Diamond and Verrecchia 1991). However, small firms are often risk-averse and have different demands on raising capital, so they do less information disclosure. Lack of public information, investors consider that they assume higher risks when offering capital to small firms, so they only provide limited funds. Therefore, small firms are more natural to run themselves in a financing stone wall (Diamond and Verrecchia 1991; Ebben and Johnson 2011).

The disclosure content is also concerned with firm performance. Lang and Lundholm (1993) conclude the relationship between them is mixed: the researches on early periods suggest firms disclose more frequently when the earnings or forecasts are good news; in the later researches, the likelihood of disclosing favorable information is as much as the likelihood of unfavorable one; recently researches provide the evidence that firms issue more bad news than good news in disclosure.

The disclosure quality is the distributional characteristics of an uncertain event and shows the firms' effectiveness of communications with public investors, and high-quality disclosure reduces the information advantages of the management teams and conveys necessary information to assists the investors make judgments (Verrecchia 1990; Brown and Hillegeist 2007; Rogers 2008). Managers can change the uncertainty faced by investors by affecting the quality of disclosure (Forker 1992). The diversity of disclosure quality leads to different levels of information asymmetry in the stock market (Welker 1995). The information asymmetry also happens when some informed investors acquire private information, and when they use such information for trading, adverse selection problems occur (Brown and Hillegeist 2007). Akerlof (1970) comes up with a second-hand automobile market as an example to show the adverse selection problems caused by information asymmetry, which leads markets to shrink, even disappear.

Welker (1995) and Heflin, Shaw, and Wild (2005) find that the relationship between disclosure quality and levels of information asymmetry is the opposite. Brown and Hillegeist (2007) conclude three means for disclosure quality to decease information asymmetry. The first one is to change the behavior of uninformed investors. When the quality of disclosure rises, inform trading is relatively reduced, thereby reducing the level of information asymmetry (Fishman and Hagerty 1989). The next one is to reduce investors' incentives to obtain private information. When companies disclose publicly, investors have fewer incentives to obtain private information (Diamond 1985). The last method is that improving the quality of disclosure can reduce the frequency of private information because more information is disclosed rather than privately discovered.

Decreasing information asymmetry is conducive to improve liquidity (Welker, 1995); however, transparency also has opposite effects (Green 2007). The two conditions lie on traditional cost-benefit analysis. Specifically, when benefits to analyze the public information far exceed costs to acquire the information, all investors would actively produce private information, which weakens transparency and improve liquidity. On the contrary, if the costs greatly outweigh the benefits, investors would not choose to process public information so that liquidity remains unchanged. Between the above two situations, sophisticated investors still stand on the side of benefits over costs because they own advantages of low process costs; oppositely, for unsophisticated investors, the process costs are relatively high so that they would abandon acquire private information. Such a situation also causes information asymmetry. The group of uninformed investors come back to the "adverse selection" problem and then exit the market. Thus, the following situation leads to the impairment of liquidity (Balakrishnan, Ertan, and Lee 2019; Brown and Hillegeist 2007; Diamond and Verrecchia 1991). The disclosure quality determines to which situation the firm belongs to and what kind of influences on the market liquidity.

Stock markets play an important role in resource allocations since firms generate a vast amount of capital from it (Chordia et al. 2001). In an informationally efficient market that does not require transaction costs, the market prices convey all relevant information (Roll 1984). Trades divide into information-driven and liquidity-driven, the former causing a permanent impact on stock prices and the latter causing a temporary impact (Rahman, Krishnamurti, and Lee 2005). Liquidity is a flow concept, representing the ability to buy or sell assets quickly and at low cost (Chordia et al. 2001). The measure of market liquidity has two dimensions—price and quantity (Welker 1995; Charoenwong and Chung 2000; Lee, Mucklow, and Ready 1993).

Depths are on behalf of the quantity dimension, which means the number of shares available at each price (Welker 1995). Depths is an indispensable quantitative indicator for assessing market liquidity and represent the tendency of uninformed traders to provide liquidity (Lee et al. 1993; Rahman et al. 2005). When experienced uninformed traders presume that the trades are non-informational, an increase in trading activity leads to an increase in depths (Rahman et al. 2005). Even though such investors have no idea when insider trading will happen, they keep their investment consistent with insider trading by quoting smaller depths based on their experience of historical insider trading, and then quoted depths decrease (Charoenwong and Chung 2000). Such investors are more likely to quote greater depths on low-priced stocks (Harris 1994). However, when the stock price volatility increases, they will quote smaller depths to limit their losses (Ye 1995). Additionally, the quoted depths have a positive relationship with trading volume and firm sizes (Charoenwong and Chung 2000).

The price dimension means the bid-ask spreads. The ask is the purchase price, and the bid is the sales price (Welker 1995). When spreads enlarge, the trades become more expensive, especially for small traders. Stock prices can determine the relative spreads (Harris 1994). As for the reaction to insider trades or informed information, experienced uninformed traders may cope with increasing bid-ask spreads (Lee et al.1993). The bid-ask spread is positively related

to price volatility and price level and negatively related to volume and firm size (Copeland and Galai 1983; Roll 1984). Assume the dealer is risk-neutral, hence pursue a bid-ask spread which maximizes profits. If the spreads established by the deal are too wide, the dealer loses revenue from liquidity trader but less likely to lose informed traders. On the contrary, if the spreads are too narrow, the dealer is more likely to loss informed traders but attract liquidity traders. Thus, the best option for a dealer is to find a balance between informed and uninformed trading (Copeland and Galai 1983).

Ye (1995) proves that when the probability of informed trades increases, experienced investors will increase spreads and reduce the quotes. Lee et al. (1993) show the relationship between two dimensions that shallow depths always accompany wide spreads and that the combination leads to a decrease in liquidity. The spread is the largest at the opening of the market and then continues to decrease until it slightly rises before the market closes. However, the depths present the opposite pattern. Information asymmetry gives rise to wider spreads and lower depths because uninformed investors are intentional to limit their losses due to lack of information (Ahn and Cheung 1999). All the above researches confirm the inverse relationship between spreads and depths.

Many researchers only use price dimension as the indicator of market liquidity and ignore depths (Welker 1995; Fishman and Hagerty 1995). They prove that there is a negative correlation between the spreads and disclosure quality (Brown and Hillegeist 2007; Chen 2007). Furthermore, some other researchers emphasize the importance of combining two indicators to represent liquidity (Lee et al.1993; Chordia et al. 2001; Chen 2007). Lee et al. (1993) indicate that the combination of narrower spreads and deeper depths is sufficient to reach an increase in liquidity.

Kyle (1985) investigates that in the case of constant demand, the informed traders possess smaller information advantages when the market liquidity is higher. Diamond and Verrecchia

(1991) extend the research and verify that accurate disclosure increase the liquidity of the stock market. They also present that disclosing private information deprives informed traders' information advantages, but that if managers reserve part of the information, disclosing managers' private information does not affect market liquidity. Welker (1995) affirms the negative relationship between disclosure policy and market liquidity.

Most previous studies have concluded that the better the quality of disclosure, the greater the liquidity (Fishman and Hagerty 1995; Welker 1995; Sundgren, Mäki, and Somoza-López 2018). Chen (2007) proves that disclosure quality influences liquidity mainly by spreads but exerts little influence on the depths. However, Heflin, Shaw, and Wild (2001) attest that depths, like spreads measure, is negatively related to the disclosure quality. They explain that the traders have limited funds and therefore are unable to trade more substantial volumes of stocks and that thus, the depths decrease. Bloomfield and Wilks (2000) make the same explanation as Heflin et al. (2001), and they also reach another reason that when investors are forced to a larger position, the risk impacts matter much more. Heflin et al. (2005) do further research and conclude that the trading costs for firms with high-quality disclosure are much lower; thus, the market liquidity still has the opportunity to improve for these firms, even the quoted depths are more shallow.

From the previous literature, I expect that my research result will follow the pattern of the positive relationship between disclosure quality and market liquidity, so I derive the following two hypotheses:

H_1: The disclosure quality is positively related to quoted depths in the stock markets.

H_2: The disclosure quality is negatively related to bid-ask spreads in the stock markets.

III. RESEARCH METHODOLOGY

My research explores the relationship between disclosure quality (independent variable) and market liquidity (dependent variable). The liquidity is measured by two dimensions, which are price and quantity. Thus, my research tests the relationship of disclosure quality with two liquidity indicators separately.

The relationship between Disclosure Quality and Market Liquidity

Butler, Grullon, and Weston (2005) list eight variables to be on behalf of Market liquidity. The indicators include quoted spreads, effective spreads, relative effective spreads, quoted depths, volumes, turnovers, trade sizes, and liquidity index. Due to my research limitations, I choose two common indicators among them. Lee et al. (1993) use quoted spreads, effective spreads, and quoted depths to present liquidity. Chen (2007) employ effective spreads, relative spreads, and quoted depths. Heflin et al. (2001) adopt effective spreads and quoted depths. Based on previous literature, I apply effective spreads (ES) and total quoted depths (TQD) as the proxies of liquidity and develop the models:

$$TQD = a_0 + a_1DQ + a_2SIZE + a_3PR + a_4\,RTVOL + a_5TSZ + a_6TF + a_7LEV + \varepsilon;$$

$$ES = a_0 + a_1DQ + a_2SIZE + a_3PR + a_4\,RTVOL + a_5TSZ + a_6TF + a_7LEV + \varepsilon.$$

Model to Measure Liquidity

Total quoted depths (TQD) are the quantity measure of liquidity. I compute TQD as the sum of the number of shares quoted at the ask prices (Q_A) and the one at the bid prices (Q_B), which shows

$$\text{TQD} = Q_B + Q_A.$$

The other proxy, effective spreads (ES), is the price measure and calculates as follows:

$$\text{ES} = 2 \times |TP - (P_A + P_B)/2|$$

where P_A is the ask quoted price and P_B is the bid quoted price at the transaction, and TP presents the trading price (Heflin et al. 2001).

Disclosure Quality Measures

The researches focused on the stock market in America apply disclosure score published by the Financial Analysts Federation (FAF). The FAF reports evaluate disclosure quality based on annual and required published information, quarterly reports and other non-required published information, and other aspects such as investor relationships and communication with analysts (Welker 1995; Heflin et al. 2001).

As I focus on China firms, the disclosure evaluation scores from the Shenzhen Stock Exchange (SZSE) apply to be the proxy of disclosure quality. As an authoritative organization, SZSE evaluates disclosures based on six aspects, which are authenticity, accuracy, integrity, timeliness, legal compliance, and fairness. The contents appraised are highly complete, including both mandatory and volunteer disclosures and both financial and non-financial information. Therefore, the proxy of disclosure quality is sufficiently reliable and authoritative. After evaluating, SZSE divides the firms' disclosures to four levels of A, B, C, and D. A means outstanding, B means good, C means pass, and D means fail. Even though Shanghai Stock Exchange (SSE) has conducted an almost same disclosure assessment with the SZSE, SSE started to publish the disclosure assessment results in recent two years; thus, the data sample from SSE is not sufficient to satisfy the research requirements, so my research only focus on the firms listed on SZSE.

However, the rating scores, from A to D, are strings, and I need to turn them into numbers in the model. I introduce a rule that the quality scores in letters are corresponding to the scores in natural number as follow:

Score A = 4; Score B = 3; Score C = 2; Score D = 1.

Control Variables

The quoted depths are positively related to firm sizes and trading volume and negatively related to stock price and its volatility (Ye 1995; Charoenwong and Chung 2000; Harris 1994). Stock price and price volatility positively affect effective spreads, and trading volume and firm sizes negatively affect the indicator (Copeland and Galai 1983; Roll 1984). When traders expect to limit their loss, they will quote lower depths and increase the bid-ask spreads; this indicates that stock return is negatively related to bid-ask spreads and positively related with depths (Lee et al.1993; Rahman et al. 2005). Chen (2007) indicates that market liquidity is also related to the leverage ratio. From the above literature, I conclude that stock liquidity is under the influence of other aspects, including firm size, share price, return volatility, trading activity including trade size and frequency, and leverage ratio. Those factors should be controlled when investigating the relationship between liquidity and disclosure quality.

Heflin et al. (2001) and Embong, Mohd, and Sabri (2012) apply the market value of common equity to represent the firm size. Following the previous literature, the natural log of market value should be used:

$$\text{SIZE} = ln \text{ (Market value of common equity).}$$

Other control variables' proxies do not have much controversy. The share price applies the average of ask price and bid price, and shows:

$$\text{PR} = (P_A + P_B)/2;$$

The proxy of stock return is the volatility of the rate of return, and the formula is:

$$\text{RTVOL} = \text{Daily average of standard deviation of rate of return.}$$

The indicators of trading activity are trade size and trade frequency. The trade size means the number of shares per trade, and trade frequency is the number of trades every trading day. Based on the research of Chen (2007), the natural log should use in both indicators; thus I get the following two formulas:

TSZ = ln (Average number of shares per trade),

TF = ln (Average number of trades per day).

The leverage ratio displays the firms' financing structure and shows the ratio of debt to equity financing. The formula is:

LEV = Total liability/ Total equity.

In my model, I consider to include the industry affect and year effect. Brown and Hillegeist (2007) reach the conclusion that the impact of disclosure quality on asymmetry may change systematically between companies. In addition, there are many external factors affecting market liquidity in different years and different industries. For instance, a specific industry is in different periods of industry cycles in different years; for the same year, various sectors are in different periods. Some other factors, such as government policies and fashionable lifestyles, may play the same role. Therefore, it is so necessary to control the industry and year affect that I add year dummy and industry dummy in my regression model.

IV. EMPIRICAL RESULTS

My study objects are A-share companies listed on SZSE, including main board, SME board, and growth enterprise board. Disclosure quality data download from the disclosure of regulatory information on the SZSE's official website. Every year, many companies are listed on the SZSE, but few companies delist, so the number of my research objects is increasing year by year. The remaining data are derived from CSMAR database. Since the volume trade is the only valid data about stock trade in the CSMAR database, I apply data in this part to compute the total quoted depths and effective spreads. Firstly, I calculate the two proxies of market liquidity of each volume trade and then average them to get the annual average total quoted depths and average yearly effective spreads for each company. Additionally, the data in China Stock Market Series of CSMAR has been available since 2003, so my research period is from

2003 to 2016, a total of 14 years. Furthermore, all control variables are available in the database. Last, I delete records with incomplete data, including records that do not have all control variables and use the remaining records to complete my research.

Table 1 shows the distribution of the four independent variables and the mean and standard deviation of the two proxies corresponding to different disclosure scores. More than half of the samples are in the case of a disclosure score of B. This distribution is reasonable, as companies are unwilling to disclose too much information to expose their financial situations and thereby reduce liquidity. At the same time, they do not want too low a disclosure score to affect their companies' images in the eyes of investors, so they will selectively disclose information. The low sample size of the score D is partly due to the fact that many companies with a disclosure score of D delist in the year in which D was rated, resulting in the incompleteness of the remaining data, so the records were kicked out during the screening. From score A to score D, the standard deviation of total quoted depths increase. This trend may indicate that the response to the depths of traders to the companies with better disclosure quality is more similar. However, from score A to score D, the standard deviation of the effective spreads shows the opposite trend. From the univariate analysis, there are specific trends between both two dependent variables and the independent variable. To fully figure out the relationship between market liquidity and disclosure quality, I need to use multivariate regression analysis.

TABLE 1
Disclosure Quality Descriptive Statistics

Disclosure Quality		**A**	**B**	**C**	**D**
Frequency		2,275	8,961	2,052	281
Percent		16.77	66.04	15.12	2.07
TQD	Mean	11.42324	11.4059	11.34098	11.59777
	Std. Dev.	.8938645	.9201183	1.05102	1.112079
ES	Mean	.3470213	.3570648	.3033399	.2316701
	Std. Dev.	2.556769	1.884893	1.57749	.922971

TABLE 2
Descriptive Statistics

	Obs	Mean	Standard Deviation	Min	Max
TQD	13,569	11.40296	.9417776	3.964615	16.78592
ES	13,569	.3446594	1.95862	0	62.28
DQ	13,569	2.975017	.6333482	1	4
SIZE	13,569	22.21546	1.081377	18.85286	28.69917
PR	13,569	17.64327	15.83341	0	213.2813
RTVOL	13,569	.0378222	.0598312	0	2.581481
TSZ	13,569	15.33868	1.074715	11.24427	20.65392
TF	13,569	8.801829	.9657284	.9444618	12.56129
LEV	13,569	1.168401	4.919894	-89.23085	328.4121

Table 2 displays the descriptive statistics for all variables in my model. The average of the natural log of total quoted depths for all recorded volume trade is 11.403, ranging from 3.965 to 16.78592. The mean of another proxy, effective spreads, is 0.345. The disclosure score has a mean of 2.98, which is close to the disclosure score "B." Table 2 only shows the mean of the natural log of trade size and frequency. Furthermore, the average leverage ratio is about 1.17. The companies at average level finance more from debt than from equity. Based on my raw data, which is before calculating the natural log of trade size and frequency, an average of 8430510 shares trades per volume trade, and every firm deals with about 9998 times every trading day.

TABLE 3
Results of the Pearson Correlations Test

	DQ	SIZE	PR	RTVOL	TSZ	TF	LEV
DQ	1.0000						
SIZE	0.2418	1.0000					
PR	0.1294	0.0645	1.0000				
RTVOL	-0.0332	-0.0378	0.1604	1.0000			
TSZ	0.0433	0.6748	-0.1511	0.0663	1.0000		
TF	0.1060	0.4923	0.2999	0.1704	0.7232	1.0000	
LEV	-0.0567	0.0989	-0.0660	-0.0052	0.0575	0.0019	1.0000

Table 3 presents the results of the correlations test. The control variables do not exert significant influences on disclosure quality. Among the correlations among control variables,

notably, the correlation between trade frequency and trade size is strong (0.7232), and between trade size and firm size is also strong (0.6748).

Table 4 exhibits the result of regression market liquidity and disclosure quality. In the empirical results, the total quoted depths and disclosure scores are inversely correlated. The result is opposite of the first hypothesis. The results indicate that those two variables exist relationship because the p-value is smaller than 0.001, and the adjusted R^2 is about 0.517. Some control variables have a certain relationship with the independent variable, including return volatility, trade size, trade frequency, and leverage ratio. The total quoted depths have an inverse relationship with share price and return volatility, and has a positive relationship with firm size, trade size, trade frequency, and leverage ratio. Most relationships match my predictions.

The inverse relationship between total quoted depths and disclosure quality could be explained by the attraction of high-quality disclosure companies. Uninformed traders prefer to invest in those kinds of companies because high quality disclosure decreases the information asymmetry between them and informed traders. However, due to their limited funds, the depths they quoted are inclined to be lower (Kavajecz 1999; Heflin et al. 2001). Another explanation from Bloomfield and Wilks (2000) is that when investors are compelled to larger positions, the risk effect indicator matters them more. The uninformed traders incline to be risk-averse, so they do not assume excessive pressure (Heflin et al. 2001). The lower depths they quoted pull down the average of total quoted depths. In addition, Heflin et al. (2005) do further research and explore the reason for the inverse relationship. They manifest that because the trading costs of firms with high-quality disclosure are lower than the ones with low quality, the market liquidity is capable of improving even the quoted depths are more shallow.

An alternative explanation is that transparency may generate the opposite effects (Green 2007). After companies make disclosure, traders process information at different levels of costs.

Experienced investors are less expensive to process than inexperienced investors. When the benefits they acquire are similar, the benefits will outweigh the cost of processing the information for experienced investors, but for inexperienced investors, the situation may be just the opposite, so they abandon to acquire private information. In this situation, information asymmetry still exists, and uninformed investors face "adverse selection" problems, and last, they exit the stock market. Under this situation, the liquidity still hurts, and thus the total quoted depths decrease.

From another perspective, information that companies try to conceal is generally harmful to the company (Fishman and Hagerty 2003). This implies that when company disclosures are more compliant and more useful for uninformed traders to make accurate decisions, disclosure contains information which makes investors abandon the trade. Therefore, even the first hypothesis should be rejected, I am not permitted to give a cursory conclusion that good disclosure quality hurts the quantity indicator of market liquidity.

The coefficient of the regression between the other proxy, the effective spreads, and disclosure quality is consistent with the second hypothesis: the higher the quality of information disclosure, the smaller the effective spreads. However, the result is not significant ($p>0.05$). This shows that the quality of information disclosure has no relationship with the improvement of effective spreads, and we cannot provide sufficient evidence to support the second hypothesis.

Combined with the stock market condition in China, the inexistent relationship could attribute to the level of trust investors have in the company's endogenous information. Based on Lu and Liu (2002), uninformed Chinese traders prefer the exogenous information of the company and macro information about the company, the quality of disclosure may not have a big impact on traders' decisions.

TABLE 4
Regressions of Market Liquidity and Disclosure Quality

VARIABLES	(1) TQD	(2) ES
DQ	-0.098***	-0.001
	(-10.319)	(-0.034)
SIZE	0.013	0.014
	(1.630)	(0.588)
PR	-0.001	0.004**
	(-1.027)	(2.575)
RTVOL	-0.222**	1.806***
	(-2.259)	(6.212)
TSZ	0.380***	-0.244***
	(29.964)	(-6.512)
TF	0.179***	0.248***
	(14.128)	(6.603)
LEV	0.003***	-0.000
	(2.824)	(-0.133)
Constant	2.450***	1.637***
	(14.993)	(3.388)
Observations	13,427	13,427
R-squared	0.518	0.051
Year FE	YES	YES
Industry FE	YES	YES
Adj. R-sq	0.517	0.0487

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

V. CONCLUSION

My research applies A-share listed companies of the Shenzhen Stock Exchange from 2003 to 2016 as data samples to study the relationship between disclosure quality and market liquidity in stock markets. In terms of market liquidity, I measure from the perspective of price and quantity. The proxy of the price dimension is effective spreads, and the proxy of the quantity dimension is total quoted depths. The disclosure quality indicator adopts the official grading of the SZSE for the quality of disclosure of companies listed on it. The disclosure scores are divided into only four categories.

From my empirical results, the high-quality disclosure of companies is inversely related with the depths of the market. There are four possible reasons. Firstly, when the quality of

information disclosure increases, companies will attract risk-averse traders. Plus, the traders who hold higher positions assume more risks. Thus, this group of conservative traders will quote lower depths. Secondly, firms with high-quality disclosure decrease the information asymmetry between informed and uninformed traders, so they attract more the latter kind of investors who benefit from high-quality disclosure. However, such investors possess constraint capital, and thus they also quote shallower depths. The third explanation can summarize as the inconsistent cost of processing information. Inexperienced investors are unable to compete with other investors due to higher information processing costs and eventually exit the market. The last one is that companies acquire higher scores in disclosure quality because they disclose more harmful information than other companies do. Thus, the investor's decision under complete information is to quote lower depths. However, under the condition that the trading price is very low, high-quality disclosure companies can still promote market liquidity. In addition, the relationship between disclosure quality and effective spreads is not significant. In conclusion, the relationship between disclosure quality and market liquidity is primarily through quantity dimension rather than through price. Even though the high-quality disclosure hurts the market liquidity on the surface, but the inverse relationship does not deny the possibility of increased liquidity, such as attracting more risk-averse uninformed traders with limited funds.

Some factors impose limitations on my research. Firstly, although the disclosure quality indicator assessed by SZSE is reliable, fair, and authoritative, the rating system only publish final results which are four possible rankings—A, B, C, and D. Hence, my independent variables are very limited. If SZSE adopts a hundred-mark system, the relationship between market liquidity and disclosure quality may be more unambiguous and significant. Furthermore, other researches about market liquidity focus on high-frequency transaction data in one year, however, the CSMAR database only has trading data of volume trades, and I adopt all of them

to measure the relationship. Therefore, the two proxies may not fully represent the complete market liquidity situation. The last one is time limitation. The next research direction will focus on verifying whether above three reasons for the inverse relationship between disclosure quality and depths are true, and draw the conclusion of the relationship between disclosure quality and market liquidity.

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