

The Influence of Mandatory ESG Disclosure on Improving Stock Liquidity-Quasi-Natural Experiment Based on A+H Shares

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Abstract. The mandatory quantitative key performance indicator (KPI)-style environmental, social, and governance (ESG) disclosure policy implemented by the Hong Kong Stock Exchange (HKEX) in 2016 offers a useful context for examining the economic impacts of mandatory non-financial disclosure. Using data of Chinese A-share listed companies between 2012 and 2023, the paper takes A+H shares as the treatment group while other A-share companies as the control group and employs a difference-in-differences method to evaluate the impact of this policy on the A-share liquidity of A+H companies. Results show that the disclosure of ESG is a mandatory requirement for a significant increase in stock liquidity of A+H companies, where the average logarithmic quoted spread of the stocks in the sample decreases by 0.152 units, or an increase in liquidity of 14.1% on average. Conclusions remain robust after running a series of tests. Based on the results of heterogeneity analysis, the role of analysts as a positive moderating factor in policy transmission is obtained. This paper provides Chinese contextual evidence on how mandatory ESG disclosure improves the market information environment from an international experience perspective, offering empirical support for improving the ESG information disclosure system and optimizing investor protection mechanisms in the A-share market.

Keywords: Mandatory ESG disclosure, stock liquidity, A+H shares, difference-in-differences, analyst coverage

1. Introduction

The concept of global sustainable development is gaining momentum, and ESG factors have become important considerations in capital market investment decisions. Investors' demand for corporate ESG information is growing, yet voluntarily disclosed information often lacks comparability and quantification [1]. Consequently, an increasing number of countries or regions have begun implementing mandatory ESG information disclosure systems to alleviate information asymmetry and improve capital market efficiency [2].

ESG information disclosure in China's A-share market remains primarily voluntary, lacking unified quantitative standards [3]. In 2015, HKEX updated its ESG Guide, moving the disclosure

requirement for 12 KPIs in the environmental dimension to a "comply or explain" semi-mandatory status and adopted it in 2016. Additionally, A+H companies undergo both voluntary disclosure in the A-share market and mandatory disclosure in Hong Kong, making it a quasi-natural experiment for people to identify the economic consequences after the introduction of mandatory disclosure policies for ESG.

Information asymmetry is a core factor affecting stock liquidity. Classical theories show that information asymmetry prompts market makers to widen bid-ask spreads, thereby reducing liquidity [4, 5], while increasing public information disclosure helps alleviate information asymmetry and improve liquidity [6]. However, some studies find that when managerial agency costs are high, information disclosure may harm liquidity because informed traders exit the market [7]. Existing empirical evidence is also inconsistent: some studies find that mandatory ESG disclosure significantly improves liquidity [2, 3, 8]. While other studies reach opposite conclusions [9]. These differences may stem from variations in policy nature, implementing bodies, disclosure content, and sample periods. This paper focuses on the HKEX's quantitative KPI-style mandatory ESG disclosure policy, testing its impact on the A-share liquidity of A+H companies.

The research samples of this paper are A+H companies from 2012 to 2023, and the control group are other A-share companies. The policy was fully put in place in 2016, and the sample interval covers the full cycle of 4 years prior to and 7 years following the policy, allowing people to fully assess the dynamics of the policy. There are three marginal contributions of this paper: first, from an international experience perspective, this paper studies the spillover effects of mandatory ESG disclosure on A-share liquidity. Second, taking intraday high-frequency data to calculate the relative quoted spread as the basic proxy variable of stock liquidity. Third, use more than one identification strategy to check the robustness of the conclusions and heterogeneity analysis, which is significant and remains valid under PSM-DID [10].

2. Institutional background and theoretical analysis

In December 2015, the HKEx updated its ESG Guide, making the disclosure on 12 key performance indicators (KPIs) of the environmental dimension of semi-mandatory "comply or explain" nature, and the new requirements will take effect on 1 January 2016. There is no longer any excuse for companies not to have an ESG report because listed companies must produce one every year – audits, warning letters and listing related sanctions are the consequences of non-compliance.

Mainland China's A-share market has not yet established unified quantitative disclosure standards for ESG, and corporate disclosure remains predominantly voluntary and qualitative. The difference in regulatory requirements between the two markets means that A+H companies face different information disclosure obligations.

Information asymmetry is one of the key elements influencing the degree of stock liquidity. Market microstructure theory indicates that information asymmetry leads the market makers to spread the bid-ask in order to avoid adverse selection risk and this decreases the liquidity [4, 5]. It is found that the more public information is disclosed, the information asymmetry becomes smaller, and liquidity can be increased [6]. There is empirical evidence to back up the above theoretical reasoning: a study of 65 countries shows that the mandatory ESG disclosure policy leads to better liquidity [2] and another study on the HKEX policy shows that it improves liquidity by around 12.2% [3]. From this it can be inferred that this paper proposes Hypothesis 1:

H1: HKEX's quantitative KPI-style mandatory ESG disclosure policy significantly improves the A-share liquidity of A+H companies.

Nevertheless, there are inconsistent findings as well. A study based on the early pilot CSR disclosure policy in China learns that compulsory disclosure has a great impact on reducing liquidity by the withdrawal of informed traders [9]. The social responsibility, another study suggests the masking effect [7]. These variations suggest that the impact of policy can be determined by certain firm characteristics.

Mandatory ESG disclosure might also have an indirect influence on liquidity in the transmission function of information intermediaries. Analysts are, of course, an important group of information intermediaries in capital markets, and they can efficiently reduce information asymmetry by professionally interpreting information. Research shows that the positive impact of ESG information disclosure on stock liquidity is more likely to be amplified by greater analyst coverage [9]. For firms with more analyst coverage, ESG information is shared on time and in an accurate manner, which can potentially lead to a greater impact on policy. Accordingly, this paper proposes Hypothesis 2:

H2: The higher the analyst coverage, the stronger the marginal effect of mandatory ESG disclosure on improving liquidity.

3. Research design

3.1. Sample selection and data sources

The research samples are the Chinese A-share listed companies from 2012 to 2023. The sample is filtered following the literature: (1) this paper excludes financial and insurance firms; (2) this paper excludes financial firms in ST, ST and delisted status; (3) leverage ratios > 1 and < 0 are winsorized following the literature [2, 3]. Finally, this paper filters out observations with missing variables. Finally, there are 37, 532 firm-year observations. CSMAR is the primary source of data.

3.2. Variable definitions

The dependent variable, Liquidity, is measured as the logarithm of the annual average quoted spread, calculated based on intraday high-frequency data. This indicator is a reverse indicator: larger values indicate worse liquidity. The interaction is the main explanatory variable *did*: *did* = 1 if the share is A+H and *did* = 0 otherwise; *Time* = 1 if the year is ≥ 2016 and 0 otherwise. *Analyst* is the natural log of (1 + number of analyst teams following the firm in a year). As in existing studies firm size (*Size*), leverage ratio (*Lev*), cash flow ratio (*Cashflow*), price-to-book ratio (*PB*), stock return volatility (*Vol*), ownership nature (*SOE*), board size (*Boardsize*) and book-to-market ratio (*BM*) are control variables.

$$Liquidity_{i,t} = \alpha + \beta did_{i,t} + \gamma X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

Where $Liquidity_{i,t}$ is the stock liquidity of firm *i* in year *t*, $did_{i,t}$ is the core explanatory variable, $X_{i,t}$ is the vector of control variables, μ_i is the firm fixed effect, λ_t is the year fixed effect and $\varepsilon_{i,t}$ is the random error term clustered at the firm level. The coefficient β is a measure of the net policy effect. If the value of β is considerable negative, it means the mandatory ESG disclosure policy has a major positive impact on stock liquidity.

4. Empirical results

4.1. Descriptive statistics

Descriptive statistics of the main variables are shown in Table 1. The sample period ranges from 2012 to 2023, and involves 37, 532 firm-year observations. The mean of Liquidity = -1.997 and standard deviation = 0.463 – this is because the original quoted spread is log transformed and then multiplied by -1, which suggests that there is a lot of variability in stock liquidity between firms. The mean of did is 0.041, indicating that approximately 4.1% of the observations are in the treatment group (A+H firms). The distributions of control variables are all within reasonable range, and winsorization process is effective in controlling the effect of extreme values.

Table 1. Descriptive statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Liquidity	37,532	-1.997	0.463	-4.040	0.234
did	37,532	0.041	0.197	0	1
Lev	37,532	0.411	0.206	0.053	0.932
PB	37,532	3.619	3.338	0.507	22.427
BM	37,532	0.627	0.249	0.115	1.206
Size	37,532	22.222	1.310	18.951	26.296
Cashflow	37,532	0.049	0.068	-0.159	0.253
SOE	37,532	0.322	0.467	0	1
Boardsize	37,532	2.111	0.199	1.099	2.890

4.2. Baseline regression results

In the first column of table 2, the coefficient of did is significantly negative at the 1% level, suggesting that upon the policy implementation, the quoted spread of A+H stocks decreased significantly and liquidity increased. Turning to control variables, leverage and book-to-market ratio have a positive correlation with the spread while firm size and cash flow have a negative correlation with the spread, all in line with the theory. This is in support of Hypothesis 1.

Table 2. Baseline regression results

Variable	(1) Liquidity
did	-0.152*** (0.024)
Lev	0.561*** (0.026)
PB	-0.005*** (0.001)
BM	0.605*** (0.019)
Size	-0.312*** (0.008)

Table 2. (continued)

Cashflow	-0.133*** (0.031)
SOE	0.083*** (0.019)
Boardsize	-0.055*** (0.021)
Constant	4.439*** (0.182)
Firm FE	YES
Year FE	YES
Observations	37,532
adj. R ²	0.728

Note: Clustered robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

4.3. Robustness tests

As shown in Figure 1, to mitigate selection bias, a 1:1 nearest neighbor matching is used for PSM-DID, and the matched coefficient of did is -0.105 (p<0.01). Using entropy balancing, which incorporates pre-policy liquidity into covariates, the weighted coefficient of did is -0.101 (p<0.01). Both results are consistent with the baseline.

A parallel trend test is conducted on the entropy-balanced sample, with 2014 as the base period. Column (3) of Table 3 shows that the coefficients for the pre-policy periods d_neg3 and d_neg4 are both statistically insignificant, satisfying the parallel trend assumption; and the coefficients for the periods after the policy are significantly negative. Although the coefficient for d_2 is positive and significant, this may be due to short-term market fluctuations, but the overall post-policy effect remains robust. After 200 random placebo samplings, the true coefficient falls at the extreme left tail of the distribution of random coefficients, passing the placebo test.

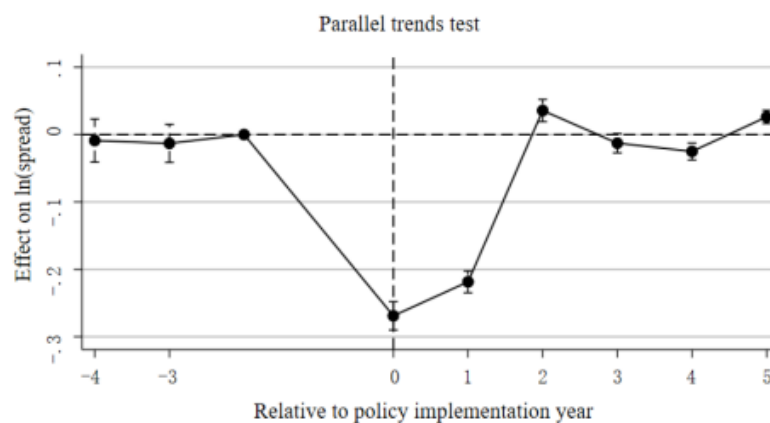


Figure 1. Parallel trends test

Picture credit: Original

Table 3. Robustness test results

Variable	(1) PSM-DID	(2) Entropy Balancing	(3) Parallel Trends
did	-0.105*** (0.038)	-0.101*** (0.038)	
d_neg4			-0.009 (0.016)
d_neg3			-0.013 (0.014)
d_0			-0.269*** (0.011)
d_1			-0.219*** (0.008)
d_2			0.036*** (0.008)
d_3			-0.013* (0.007)
d_4			-0.025*** (0.006)
d_5			0.026*** (0.005)
Controls	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	NO
Observations	3,418	37,532	37,532
adj. R ²	0.813	0.815	0.748

4.4. Heterogeneity analysis

The sample is split into two groups based on the median of analyst coverage. Table 4 indicates that the coefficient of did in the high-coverage group is -0.099 ($P < 0.01$), and that in the low-coverage group -0.078 ($P < 0.1$). The interaction model indicate that analyst coverage significantly enhances the policy effect, with the coefficient of did×High Analyst being -0.125 ($p < 0.01$) confirming Hypothesis 2.

Table 4. Heterogeneity analysis results

Variable	(1) Low Coverage	(2) High Coverage	(3) Interaction Model
did	-0.078* (0.041)	-0.099*** (0.035)	-0.03 (0.033)
HighAnalyst			0.015** (0.007)
did×HighAnalyst			-0.125*** (0.030)
Controls	YES	YES	YES
Firm FE	YES	YES	YES

Table 4. (continued)

Year FE	YES	YES	YES
Observations	19,294	17,132	37,532
adj. R ²	0.783	0.770	0.760

5. Conclusion

With the quasi-natural experiment of the ESG disclosure policy in 2016 by the HKEX as the research background, this paper aims to examine the effects of this policy on the liquidity of A+H companies' A-shares by analyzing the panel data of Chinese A-share listed companies from 2012 to 2023. The key results are summarized as follows: First, mandatory ESG disclosure has a clear and robust positive impact on the stock liquidity, reducing the log of the quoted spread by 0.152 units (around 14.1%), entropy balancing and placebo tests. Second, the parallel trend test is fulfilled, and the policy effect is persistent. Third, the impact is greater for companies with more analysts and analyst coverage is a positive moderator.

Based on above, the policy recommendations this paper put forward are as follows: First, learn from the positive impact of the mandatory ESG disclosure in the HKEX and promote the development of an ESG information disclosure mechanism in the A-share market and the setting of a common quantitative disclosure standard. Second, better information intermediation by analysts through improving the bridging role and promoting the inclusion of ESG information in research frameworks and market efficiency in absorbing ESG information. Third, implement the differentiated ESG disclosure regulatory measures and give technical assistance to SMEs in the poor information ecology and gradually roll them out to the entire market, with priority given to piloting detailed ESG quantitative disclosure rules by listed firms with higher foreign ownership ratios.

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