

ESG, Financial Constraint and Financing Activities: A Study in Chinese Market^{*}

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This version: August 14, 2023

Abstract

This paper investigates the impact of Chinese firms' ESG performance on their financial constraint and financing activities. We find a negative association between firms' ESG performance and their financial constraint driven by the Chinese government's commitment to tackling climate change. Compared with state-owned enterprises (SOEs), non-SOEs have alleviated their financial constraint through both equity and debt issuance, thanks to the stock price appreciation and green credit. High-pollution firms benefit from both equity and debt issuance, while low-pollution firms mainly finance through equity issuance. Our findings demonstrate the leading role of the Chinese government in its domestic capital markets.

JEL Classification: G10, G3

Keywords: Climate change; ESG; Financial constraint; China

^{*} We are grateful for valuable comments from Lei Lu and Zhao Rong.

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1. Introduction

Since the emergence of ESG/CSR, the question of whether firms can do well by doing good has received enormous academic attention (Deng et al., 2013; Liang and Renneboog, 2017). Generally, firms can reduce their financial constraint by improving their ESG/CSR performance (El Ghoul et al., 2011; Cheng et al., 2014; El Ghoul et al., 2018; Banerjee et al., 2020). However, there is a lack of in-depth research on such an association in Chinese stock markets. Compared with global stock markets, Chinese stock markets are unique in terms of strong political influence and the dominating role of state-owned companies in the economy. Traditionally, Chinese non-state-owned firms are financially discriminated against by banks in terms of poor access to external funding. These firms have to raise capital by issuing equities, which are greatly supported by reputation and relationships (Allen et al., 2005).

Improving ESG performance is one of the efficient ways to establish a reputation, especially when the Chinese public awareness of climate change is boosted by a strong government commitment to climate change issues. Zhang et al. (2021) show that since the Chinese government's enforcement of environmental issues was initiated in 2016, ESG firms in China have performed better than non-ESG firms in Chinese stock markets.

A higher stock price helps firms raise funds through equity financing without significant dilution. Motivated by the evidence above, we expect to see that improving ESG performance can build a reputation and attract investors' attention, especially for private and foreign firms in China. Then, these firms can be less financially constrained and make more use of equity than debt when raising funds (due to bank discrimination). Moreover, this should only happen in and after 2016, thanks to the growing public attention to environmental protection. However, to the best of our

knowledge, there is no direct evidence of *how* Chinese firms alleviate their financial constraint after improving their ESG performance. In this paper, we aim to fill the gap.

Using a sample of Chinese firms from 2010 to 2020, we confirm the previous finding of a negative association between firms' ESG scores and their future financial constraint. By splitting the sample into 2010-2015 and 2016-2020, however, such a relationship is only significant in the second period, during which the Chinese government started to dedicate itself to climate change issues. This finding indicates the dominating role of the Chinese government in its domestic capital market.

Then we investigate the impact of ESG scores on firms' financing activities in two sample periods. In terms of equity financing, we show that ESG has become a crucial factor that drives firms to issue equities since 2016, thanks to the significant stock price appreciation due to ESG awareness. Among debt financing, we find that good ESG performance does not affect debt financing before 2016 but significantly increases firms' debt issuance in and after 2016.

Next, we examine whether the unique features of Chinese firms, including the type of ownership and pollution level, would affect our baseline results. First, we allocate firms into SOE and non-SOE groups according to their ownership. We find that non-SOEs have benefited more than SOEs from the rising public awareness of ESG. Specifically, compared with SOEs, non-SOEs have significantly issued more debt and equities per unit of increase in ESG score since 2016. This finding implies that the external financing conditions have been substantially improved for non-SOEs, which are traditionally discriminated against by banks.

Second, we classify firms into low and high-pollution groups following Huang et al. (2022). Our results show that ESG activities have no significant impact on firms' financial constraint

regardless of their pollution level before 2016. However, due to the rising public attention to climate change, an improvement in ESG could significantly alleviate firms' future financial constraint, especially for those in high-pollution industries. In terms of financing activities, we find that high-pollution firms have benefited from both equity and debt issuance since 2016, while low-pollution firms only benefited from equity issuance. This finding is consistent with the fact that the Chinese government has initiated a series of dedicated debts (e.g., green bonds) to promote firms to mitigate pollution.

Our paper contributes to the literature in several ways. First, we confirm the general negative association between firms' ESG performance and their financial constraint in Chinese stock markets. Moreover, we show that this association is mainly driven by the period in and after 2016. Considering the strong Chinese government commitment to environmental protection in 2016, our findings demonstrate the dominating role of the government in the Chinese market, which may be unique compared with other global markets. Investors should pay attention to government announcements to achieve better performance. Second, we extend the literature by further investigating how ESG performance changes firms' choice of financing methods according to their unique characteristics, including whether they are controlled by the government or in high-pollution industries. Lastly, our study confirms that a series of dedicated debts indeed have alleviated vulnerable firms' financial constraint, suggesting the important role of government action in resolving climate change issues.

Our research also sheds light on policymakers: the importance of regulation on greenwashing behaviour. Since the government's commitment to tackling climate change is growing over time, our finding of a positive association between equity financing and ESG activities implies that firms' greenwashing incentive will become stronger. Once investors realize such behaviour, the bad news

may trigger a stock price crash risk. What's worse, such loss of trust may spill over from one company to another, thereby destabilizing the whole stock market and slowing down the transition from a brown economy to a green economy. We call for growing attention to greenwashing behaviour as documented in the literature (e.g., Du, 2015; Yue and Li, 2023; Zhang, 2023).

2. Literature Review and Hypothesis Design

The literature shows that firms can mitigate their financial constraint by improving ESG scores (e.g., Sharfman and Fernando, 2008; Nandy and Lodh, 2012; Xu and Li, 2020; Kong, 2023). In China, Xu and Li (2020) show that environmentally-friendly firms are able to attract more social capital through green credit. Kong (2023) finds that Chinese family businesses with better ESG scores face less debt financing costs thanks to stronger support from creditors. Motivated by these studies, we expect to see the same association between ESG scores and financial constraint in our sample. Hence, our first hypothesis is described as follows:

H1: Firms with higher ESG scores face lower financial constraint.

Next, we examine the time-varying impact of ESG scores on firms' financing behaviour. Zhang et al. (2021) find that Chinese firms' stock performance was not positively rewarded by their ESG activities until 2016, during which the Chinese government greatly emphasized its commitment to implementing an environmental protection policy. When their equities receive dramatic appreciation, issuing stocks could be a more convenient way for them to alleviate financial constraint. Hence, motivated by Zhang et al. (2021), we expect to observe a stronger and positive association between ESG score and equity financing since 2016. Our second hypothesis is presented as follows:

H2: Firms with higher ESG scores use more equity financing after 2016.

Regarding debt financing, the Chinese government has established a series of green loans and green credit to assist its economic transformation. These green debts specifically facilitate firms with their environmentally-friendly investments under the guidance of green credit regulation policy (Zhang, 2021). Motivated by this fact, we conjecture a positive association between firms' ESG scores and their debt financing behaviour. Our third hypothesis is presented as follows:

H3: Firms with higher ESG scores use more debt financing after 2016.

The Chinese market is dominated by state-owned firms. Considering this unique feature, we explore the impact of firm ownership on our baseline results. It is well-known that Chinese non-state-owned firms are significantly discriminated against by banks (Poncet et al., 2010; Guariglia et al., 2011; Zhang and Zheng, 2020). Since SOEs have better access to debt financing, we expect that the improvement in financial constraint is stronger among non-SOEs after 2016, thanks to the government's commitment to a green economy.

Equity financing is generally more costly relative to debt financing. However, given the dramatic asymmetric debt financing condition faced by non-SOEs, we expect that these firms conduct more equity financing when their stock prices are appreciated due to the attention to ESG. Considering the improvement of debt financing conditions for non-SOEs, we expect that more non-SOEs may conduct more debt financing if their ESG score is higher. On the other side, while SOEs have easy access to debt financing, equity appreciation may drive some firms to use equity financing instead. Our proposed hypotheses are as follows:

H4a: The negative association between ESG score and financial constraint is more pronounced among non-SOEs after 2016.

H4b: The positive association between ESG score and equity financing is more pronounced among non-SOEs relative to SOEs after 2016.

H4c: The positive association between ESG score and debt financing is more pronounced among non-SOEs relative to SOEs after 2016.

Lastly, we allocate firms into low- and high-pollution groups to examine whether high-pollution firms benefit more from ESG awareness. The literature shows that heavy-polluting firms have been pushed by green finance to behave in more environmentally-friendly ways. Specifically, heavy-polluting firms face greater financing costs and stricter investment regulations due to the initiation of green credit policies (Contreras et al., 2019; Liu et al., 2019). Recently, Shi et al. (2022) study the impact of green finance reform and innovations (GFRIs) on the debt-financing costs of heavy-polluting firms. They find that the initiation of GFRIs has significantly mitigated the debt-financing costs of heavy-polluting firms in those pilot zones. Motivated by these studies, we conjecture that the rising public awareness of ESG since 2016 will force high-pollution firms to do well in ESG activities, thereby mitigating their financial constraint more than low-pollution firms. Hence, we present our hypotheses as follows:

H5a: The negative association between ESG score and financial constraint is more pronounced among high-pollution firms relative to low-pollution firms after 2016.

H5b: The positive association between ESG score and equity financing is more pronounced among high-pollution firms relative to low-pollution firms after 2016.

H5c: The positive association between ESG score and debt financing is more pronounced among high-pollution firms relative to low-pollution firms after 2016.

3. Data and Methodology

3.1 Sample

In this paper, we pay attention to the Chinese market so that our sample includes all Chinese public firms between 2010 and 2020. Consistent with previous literature, financial firms and utility firms are excluded from our sample. All annual financial and accounting data are collected from the China Stock Market and Accounting Research (CSMAR) Database, a most comprehensive research-oriented database that provides both industry-level statistics and firm-level information, such as stock and financial statement data of listed companies in China. In addition, firm-year ESG data is derived from Bloomberg, which offers a variety of proprietary scores to assess a company's yearly ESG issues and performance. As a result, the firms that do not have ESG data in Bloomberg will be removed from our sample. With all variables available, the final sample includes 7,241 firm-year observations of listed firms in China, among which 3,566 observations are from 2010 to 2015, and 3,675 observations are from 2016 to 2020.

We identify the industry distribution for our final sample following the Industry Classification Standard of National Economy 2012 in China. As shown in Appendix A, more than half (56.86%) of the firm-year observations are from the manufacturing industry during the whole sample year (10-20), and a similar pattern also holds for both subsample year groups (56.79% for 10-15 and 56.93% for 16-20). This meets our expectation and is in line with China's industrial structure in that manufacturing has always been in a key position in China's productivity development. The second industry in our sample is energy supply, such as electricity, heat, gas and water production, which represents 6.55% of the whole firm-year sample; and the third industry is wholesale and retail trade, which is 6.49% of the whole firm-year sample. Among all industries, the least one in our full sample is accommodation and restaurants since only 0.28% of observations belong to that

industry. All those industry distribution patterns are similar in either the 10-15 subsample group or in the 16-20 subsample group.

3.2 Methodology and Variable

The main methodology adopted in this paper is the ordinary least square (OLS) regression model. To test whether the ESG performance will have an effect on a firm's financial constraint, we conduct the OLS regression analysis as follows:

$$FC_{i,t} = \alpha + \beta_1 \ln ESG_{i,t} + \gamma_k \sum IND_k + \gamma_l \sum YEAR_l + \varepsilon \quad (1)$$

$$FC_{i,t} = \alpha + \beta_1 \ln ESG_{i,t} + \sum_j \beta_j Controls_{j,i,t} + \gamma_k \sum IND_k + \gamma_l \sum YEAR_l + \varepsilon \quad (2)$$

Model (1) is the baseline regression equation to explore the relationship between ESG and financial constraint. The dependent variable $FC_{i,t}$ is the financial constraint for firm i in year t , which is measured by the WW index (Whited and Wu, 2006). A higher WW index indicates a higher level of financial constraint. The main explanatory variable $\ln ESG_{i,t}$ is a measure of ESG performance for firm i in year t . It is the natural logarithm of the ESG disclosure score that is collected from the Bloomberg database (Zhang et al., 2021). Both industry fixed effect and year fixed effect are included in the baseline model. The industry fixed effect is also constructed based on the Industry Classification Standard of National Economy 2012 in China.

To make the regression model more complete, we add several control variables to the baseline model and get model equation (2). The control variables include $Size$, $Size^2$, Age , $Indep$, $Growth$, $Cash$, $Expenditure$ and $Wcmi$. $Size$ is the firm size each year, which is calculated as the natural logarithm of the book value of total assets at each fiscal year-end. $Size^2$ is the square of the firm size. Age is the natural logarithm of the firm age plus one, in which case the firm age is the number of years between a firm's founding year and sample year. $Indep$ is the ratio of independent directors

on the board. *Growth* is the change in total sales divided by total sales in the previous year. *Cash* is the cash ratio that is calculated as net cash flow normalized by total assets. *Expenditure* is the ratio of fixed assets plus intangible assets paid in cash divided by total assets. *Wcmi* is the working capital minus inventory divided by total assets in the previous year. The definitions of all variables are also listed in Appendix B.

The same OLS regression models are also applied to test the relationship between ESG and financing activities. Using the methods of Baker and Wurgler (2002), the equity issuance (*EI*) is calculated as the change in book equity plus the change in deferred taxes minus the change in retained earnings and then scaled by lagged total assets; and the debt issuance (*DI*) is calculated as the change in total assets minus the change in book equity and the change in deferred taxes and then also scaled by lagged total assets.

$$EI_{i,t} = \alpha + \beta_1 \ln ESG_{i,t} + \gamma_k \sum IND_k + \gamma_l \sum YEAR_l + \varepsilon \quad (3)$$

$$EI_{i,t} = \alpha + \beta_1 \ln ESG_{i,t} + \sum_j \beta_j Controls_{j,i,t} + \gamma_k \sum IND_k + \gamma_l \sum YEAR_l + \varepsilon \quad (4)$$

$$DI_{i,t} = \alpha + \beta_1 \ln ESG_{i,t} + \gamma_k \sum IND_k + \gamma_l \sum YEAR_l + \varepsilon \quad (5)$$

$$DI_{i,t} = \alpha + \beta_1 \ln ESG_{i,t} + \sum_j \beta_j Controls_{j,i,t} + \gamma_k \sum IND_k + \gamma_l \sum YEAR_l + \varepsilon \quad (6)$$

Models (3) and (4) are the regression equations to test whether the ESG performance affects the equity financing activities for listed firms in China. The former is the baseline model in which the dependent variable is the equity issuance, and only the main explanatory variable, as well as the two fixed effects, are included. The latter is a complete regression equation that further includes all control variables. Similarly, models (5) and (6) are regression equations to explore the relationship between ESG performance and debt financing activities. The dependent variable is

debt issuance, and the control variables are included in model (6) as a complete version. The control variables in models (4) and (6) are the same as those in model (2).

[Insert Table 1 Here]

Table 1 reports the main summary statistics of all variables mentioned above. On average, Chinese listed firms have lower equity issuance (5%) than debt issuance (8%) from 2010 to 2020. The mean ESG performance score for Chinese listed firms is 3.288, and the average age of those firms is 14 years old. Regarding the structure of the board of directors, more than one-third of the directors are independent. The annual sales growth is about 20%, and the net cash flow ratio is 14.6%, indicating quite a good profitability of Chinese listed firms during the sample years. In addition, the working capital minus inventory ratio is close to zero, suggesting a healthy liquidity status for Chinese listed firms.

4. Empirical Results

4.1 Impacts of ESG on Financial Constraint and Financing Activities

To investigate the impact of ESG performance on the financial constraint of Chinese public firms, we first use the whole sample to run the regression models (1) and (2) in which the dependent variable is the WW index to proxy for the financial constraint and the main explanatory variable is the ESG performance. Column (1) in Table 2 shows the regression results of the baseline model (1). The coefficient of $\ln\text{ESG}$ is -0.055 and significantly negative at a 1% significance level, indicating that a firm's ESG performance has a negative impact on the firm's financial constraint. In other words, a higher ESG score or better ESG performance will significantly reduce a firm's financial constraint in China. This is also consistent with the regression results in column (4) when all control variables are added. The coefficient of $\ln\text{ESG}$ turns out to be -0.006 and significant at

a 5% level, still suggesting a significantly negative relationship between ESG performance and financial constraint. The conclusion supports our hypothesis 1 and is consistent with the findings in prior studies that use samples from other countries (e.g., El Ghoul et al., 2011; Cheng et al., 2014; El Ghoul et al., 2018; Banerjee et al., 2020).

Some interesting results are also obtained in terms of the control variables. The firm age is positively correlated with financial constraint, showing that young public firms in China will have lower levels of financial constraint. One possible reason might be that young public firms have more growth opportunities and higher cash-generating potentials, causing young firms to be more attractive to external capital investors. This is also supported by the significantly negative correlation between sales growth and financial constraint, showing that firms with higher sales growth would have easier access to external capital. What's more, the net cash flow ratio is also negatively associated with financial constraint, further suggesting that greater profitability could lower a firm's financial constraint and make it easier to obtain external funding. In addition, a firm's financial constraint can also be significantly affected by the percentage of independent directors on the board, the ratio of expenditures as well as the ratio of working capital. The results show that if a firm has more independent directors on the board, higher capital expenditures or higher working capital on previous total assets, then the financial constraint of that firm will be significantly lower compared with others.

[Insert Table 2 Here]

In China, the ESG issue was not taken seriously until 2016, when seven ministries and commissions launched the Guidelines for Establishing the Green Financial System¹, targeting mandatory environmental information disclosure for all listed companies in China by 2020.

¹ The details of Guidelines for Establishing the Green Financial System:
https://www.chinadaily.com.cn/business/2016hangzhoug20/2016-09/04/content_26692931.htm

According to our hypothesis 2 that firms with higher ESG scores use more equity financing after 2016, we split our sample into two sample year groups using 2016 as the cut-off year and repeat the regression model (1) and (2) for each group. As shown in Table 2, one sample year group includes firm year observations from 2010 to 2015, and the other sample year group includes firm year observations from 2016 to 2020. With the baseline model (1), the results in columns (2) and (3) of Table 2 indicate that ESG performance can significantly and negatively affect a firm's financial constraint for both sample year groups. However, the coefficient difference of *LnESG* between the two groups at the bottom of Table 2 shows that the impact of ESG performance on financial constraint is significantly deeper for the sample year group 16-20, which implies that firms have put more effort into the ESG issues since 2016 and investors have also paid more attention to the ESG activities and performance disclosures when making investment decisions. This is further supported by the results in columns (5) and (6) when we include all control variables in the regression. For sample year group 10-15, the coefficient of *LnESG* is insignificant, indicating that ESG performance actually does not influence a firm's ability to access external capital before 2016. For the sample year group 16-20, however, the coefficient of *LnESG* becomes significantly negative, showing that better ESG performance can significantly lower a firm's financial constraint since 2016. The different impact of ESG on the firm's financial constraint is probably because the importance of environmental, social and governance issues was not realized in China until 2016, when the Chinese government made official policies regarding the mandatory disclosure of ESG activities and performance, making the ESG disclosure score an influence factor in terms of financial constraint since 2016. The significant coefficient difference of *LnESG* between the two groups at the bottom of columns (5) and (6) also supports our finding that ESG performance negatively affects a firm's financial constraint in China, but this relationship has only been in place

since 2016 when ESG issues came to the forefront in China. In this sense, our finding deepens the existing studies on the impact of ESG on Chinese firms' financial constraint by highlighting the crucial role of public awareness, especially raised by the Chinese government.

[Insert Table 3 Here]

Due to the above findings, we further expect that a firm's ESG performance will probably influence the ability or selection of external financing. Therefore, our next step is to test the relationship between ESG performance and two main external financing methods, including equity financing and debt financing. Table 3 reports the regression results of models (3) and (4) when the dependent variable is the amount of equity issuance for sample year groups 10-15 and 16-20, respectively. For sample year group 10-15, the coefficient of $\ln\text{ESG}$ is significantly negative at the 5% level, but it becomes insignificant when all control variables are included, which indicates that ESG performance may not have a significant relationship with equity financing before 2016. As for sample year group 16-20, the coefficient of $\ln\text{ESG}$ is always positive and significant at a 1% level regardless of the inclusion of control variables, suggesting that better ESG performance will significantly increase the amount of equity issuance in 2016 and after. If we compare the coefficient of $\ln\text{ESG}$ for sample year group 16-20 in column (4) with that for sample year group 10-15 in column (3), the coefficient difference at the bottom is significantly positive, further implying that the ESG performance does become an important factor to affect the equity issuance, but it takes effect only in and after 2016 when the government announced the requirement of ESG disclosure. This finding is consistent with our hypothesis 2.

[Insert Table 4 Here]

In addition, models (5) and (6) are also applied to investigate whether ESG performance is associated with debt financing and whether there are differentials between the two sample year

groups as well. The results in columns (1) and (3) of Table 4 are obtained with sample year group 10-15 and clearly show that a firm's debt issuance is not significantly correlated with ESG performance in China during 2010-2015. Starting from 2016, however, we find that the ESG performance has a significantly positive effect on debt issuance based on the figures in columns (2) and (4) when we use the sample year group 16-20. A Chinese listed firm with better ESG performance will have a larger amount of debt financing during the time period from 2016. The coefficient difference also indicates that the coefficient of $\ln\text{ESG}$ with sample year group 16-20 is significantly higher than that with sample year group 10-15. Therefore, our findings suggest that good ESG performance does not affect debt financing before 2016 but significantly increases debt issuance in and after 2016, emphasizing the importance of ESG issues in China. Our hypothesis 3 is thereby supported.

4.2 Non-SOE and SOE

Compared with other countries, China has more state-owned enterprises (SOEs) that account for more than half of the market capitalization. Due to the specialties of SOEs in China, it is necessary and worthy to test whether the ESG performance has different impacts on SOEs and non-SOEs for different sample years. Therefore, we further subdivide each sample year group into an SOE group and a non-SOE group and conduct the regression models for each subgroup.

As shown in Table 5, we first run regression model (2) within each subgroup to test the relationship between the financial constraint and the ESG performance. During the years between 2010 and 2015, the ESG performance is not significantly correlated with the financial constraint no matter whether the firm is state-owned or non-state-owned, which can be seen from the insignificant coefficient of $\ln\text{ESG}$ in columns (1) and (2) of Table 5. This is consistent with our

finding in Section 4.1 that ESG performance does not affect a firm's financial constraint before 2016. From 2016 onwards, however, the results in columns (3) and (4) turn out to be different and complicated. With non-stated-owned firms in column (3), the ESG performance is negatively associated with the financial constraint at a 1% level; while with state-owned firms, the relation between ESG performance and financial constraint becomes insignificant. In other words, a firm's financial constraint in China will be significantly weakened if the ESG performance is better, but this is only for non-stated-owned firms from 2016 onwards. This supports the results in Table 2 and further shows that the significant relation between financial constraint and ESG performance between 2016-2020 is mainly driven by non-state-owned firms in China, thereby supporting our hypothesis 4a. This is probably because the state-owned firms have the government as a guarantor so that their level of financial constraint will not be easily affected, while the non-stated-owned firms have to show good performance to creditors and investors to get external capital, especially when ESG issues attract people's attention in China since 2016.

[Insert Table 5 Here]

To test whether the external financing will be influenced by the stated-owned or non-stated-owned characteristics, we next run regression models (3) to (6) for each subgroup. Table 6 exhibits the results of models (3) and (4) in which the dependent variable is equity issuance. In columns (1) and (2) with firm-year observations during 2010-2015, the coefficient of $\ln\text{ESG}$ is not significant for either state-owned or non-state-owned groups, supporting the conclusion in Table 3 that ESG performance does not affect the amount of equity financing for Chinese public firms before 2016. Similarly, using firm-year observations between 2016-2020, the results in columns (3) and (4) show that there is always a significantly positive relationship between ESG performance and equity issuance regardless of the state-owned feature, which is also consistent with the findings in

Table 3. However, if we compare column (3) for the non-state-owned group with column (4) for the state-owned group, the coefficient of $\ln\text{ESG}$ in column (3) is higher than that in column (4), and the coefficient difference is significant at a 1% level. This suggests that better ESG performance will significantly increase equity issuance since 2016, and this effect is especially stronger for non-state-owned firms. This conclusion is consistent with our hypothesis 4b.

[Insert Table 6 Here]

In addition to equity issuance, we further use debt issuance as a dependent variable and run regression models (5) and (6) within each subgroup. From columns (1) and (2) in Table 7, it is not surprising that ESG performance is uncorrelated with debt issuance before 2016, consistent with the results in Table 4. Between 2016-2020, the ESG performance is only positively significant for non-state-owned firms at a 1% level, and the coefficient is significantly higher than that of state-owned firms. This is probably because, with better ESG performance, debtholders may be more willing to lend money to non-state-owned firms. In terms of the state-owned group, there is no significant relation between ESG performance and debt issuance. Debtholders probably don't need to worry about how the state-owned firms deal with ESG issues because the government takes responsibility for the firms, and the debtholders always have a higher priority than equity holders. The significant impact of ESG on non-SOEs relative to SOEs after 2016 confirms our hypothesis 4c.

[Insert Table 7 Here]

4.3 Low-Pollution and High-Pollution

It is known that high-pollution firms have encountered significant pressure to operate in a more environmentally-friendly way, such as upgrading facilities, investing in green innovation, etc. In

this section, we explore whether our baseline finding will be different across low and high-pollution firms. Following Huang et al. (2022), we allocate firms into low-pollution and high-pollution groups according to their industry classification.

We rerun our main regressions of firms' financial constraint on their ESG score for low and high-pollution firms, respectively. Moreover, we split the sample according to the year 2016 to examine the impact of government commitment on our findings. Table 8 presents the result. Columns (1) and (2) show that there is no significant impact of ESG activities on mitigating firms' financial constraint, regardless of their pollution level before 2016. However, the coefficient of ESG turns out to be negatively significant in columns (3) and (4), implying that firms are able to enjoy a better external financing condition if their ESG score is higher since 2016. More importantly, this effect is found to be stronger among high-pollution firms relative to low-pollution ones, supporting our hypothesis 5a.

[Insert Table 8 Here]

Table 9 reports the impact of ESG on the equity financing activities of high and low-pollution firms. Columns (1) and (2) show no significant association between firms' ESG activities and their equity issuance, regardless of their pollution level, before 2016. This finding suggests that investors pay no attention to firms' investment in ESG, so an improvement in firms' ESG score fails to mitigate their equity financing costs. However, since the clear commitment of the Chinese government to climate change in 2016, all firms have benefited from their ESG activities in terms of lower cost of equity capital. Moreover, compared with low-pollution firms, high-pollution firms issue more equities per unit of ESG score. For example, one standard deviation of increase in ESG score is associated with 0.089 units of equity issuance for the low-pollution group, but it grows to 0.161 for the high-pollution group. This finding suggests that government commitment plays a

crucial role in tackling climate change issues by promoting investors' valuation of high-pollution firms' equities. These findings are in line with our hypothesis 5b.

[Insert Table 9 Here]

Table 10 presents the impact of ESG score on firms' debt financing activities. Before 2016, we do not find any significant association between high-pollution firms' ESG activities and their debt issuance. However, the significant and positive coefficient of LnESG in column (4) indicates that a better ESG score also promotes high-pollution firms to issue debt after 2016. However, we do not find a similar relationship among low-pollution firms in the same period. The divergent impact of ESG on high and low-pollution firms may look hard to understand, but actually, it is in line with the fact that government commitment has led to a series of dedicated debts, such as green credit and green bonds, to facilitate polluting firms to mitigate pollution since 2016. Our hypothesis 5c is thereby supported.

[Insert Table 10 Here]

5. Conclusion

In this paper, we examine the impact of firms' ESG performance on their future financial constraint and financing activities in China. Consistent with previous studies, we find that firms' financial constraint could be alleviated if their ESG score increases. However, by splitting the sample period into 2010-2015 and 2016-2020, we show that the general negative association is only significant since 2016, when the Chinese government sent a strong signal to tackle climate change.

When further investigating firms' financing activities, we find that firms with a better ESG score significantly issue more debt and equity in the second period. Specifically, vulnerable firms, such as non-SOEs and high-pollution firms, have received the largest improvement in equity issuance due to the dramatic stock price appreciation driven by public awareness of climate change. Meanwhile, their debt financing conditions have also been substantially improved thanks to the initiation of green debt. On the contrary, SOEs that traditionally have unconstrained debt financing conditions issue more equities but reduce debt issuance at the same time. Our findings demonstrate the key role of the Chinese government in transforming its brown economy into a green economy, highlighting the importance of policy consistency toward climate change.

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Appendix A. Sample Distribution with Industries

Industry code	Industry	Sample Year					
		10-20		16-20		10-15	
		Freq	Ratio	Freq	Ratio	Freq	Ratio
A	Agriculture, Forestry, livestock farming and fishery	119	1.64%	56	1.52%	63	1.77%
B	Mining	307	4.24%	153	4.16%	154	4.32%
C	Manufacturing	4,117	56.86%	2,092	56.93%	2,025	56.79%
D	Electricity, heat, gas and water production and supply	474	6.55%	245	6.67%	229	6.42%
E	Construction	209	2.89%	107	2.91%	102	2.86%
F	Wholesale and retail trade	470	6.49%	243	6.61%	227	6.37%
G	Transportation	262	3.62%	112	3.05%	150	4.21%
H	Accommodation and Restaurants	20	0.28%	11	0.30%	9	0.25%
I	Information transmission, software and information technology services	395	5.46%	207	5.63%	188	5.27%
K	Real estate	412	5.69%	205	5.58%	207	5.80%
L	Leasing and Business Service	94	1.30%	48	1.31%	46	1.29%
M	Scientific research and technical services	41	0.57%	28	0.76%	13	0.36%
N	Water conservancy, environment, and public facilities management	90	1.24%	49	1.33%	41	1.15%
Q	Health and social work	28	0.39%	18	0.49%	10	0.28%
R	Culture, sports and entertainment	166	2.29%	84	2.29%	82	2.30%
S	Public administration, social security, and social organization	37	0.51%	17	0.46%	20	0.56%
Total		7,241	100%	3,675	100%	3,566	100%

Appendix B. Definitions of All Variables

Variables	Definitions
Dependent variables	
<i>FC</i>	WW Index. $WW = -0.091 * \text{Cash} - 0.062 * \text{DivPos} + 0.021 * \text{Lev} - 0.044 * \text{Size} + 0.102 * \text{ISG} - 0.035 * \text{Growth}$. Note: DivPos: Dummy variable of Cash dividend payment; Lev: Total liabilities divided by total assets; ISG: Industry average sales Growth rate
<i>EI</i>	is the change in book equity minus the change in retained earnings [Δ book equity + Δ deferred taxes – Δ retained earnings] scaled by lagged assets
<i>DI</i>	is the change in assets minus the change in book equity [Δ total assets – Δ book equity – Δ deferred taxes] scaled by lagged assets.
Independent variables	
<i>LnESG</i>	Ln (1+ESG) (Source: Bloomberg)
Control variables	
<i>Size</i>	The natural logarithm of the book value of total assets at the fiscal year-end.
<i>Size2</i>	The square of <i>Size</i>
<i>Age</i>	The natural logarithm of the age of the firm plus 1.
<i>Indep</i>	The ratio of independent directors on the board.
<i>Growth</i>	Total sales in year t minus total sales in year t-1, and then divided by total sales in year t-1
<i>Cash</i>	Net Cash flow normalized by total assets.
<i>Expenditure</i>	Construction of fixed assets intangible assets paid Cash divided by total assets
<i>Wcmi</i>	Working capital minus inventory divided by total assets in year t-1.
Group Variables	
<i>Industry</i>	Industry Classification Standard of National Economy 2012.
<i>SOE</i>	Dummy variable that equals 1 if the actual controller is country and 0 otherwise.
<i>Pollution</i>	Dummy variable that equals 1 if the industry is B06, B07, B08, B09, C17, C19, C22, C25, C26, C27, C28, C30, C31, C32, C33, D44 and 0 otherwise. (Huang et al., 2022)

Table 1. Summary Statistics of Variables

This table reports main summary statistics of all variables. The definitions of all variables are listed in Appendix B.

Variable	N	Mean	Std	Min	Median	Max
<i>FC</i>	7241	-1.064	0.067	-1.217	-1.066	-0.892
<i>EI</i>	7241	0.050	0.138	-0.064	0.006	0.870
<i>DI</i>	7241	0.080	0.166	-0.208	0.032	0.985
<i>LnESG</i>	7241	3.288	0.292	2.577	3.316	3.999
<i>Size</i>	7241	23.116	1.216	20.494	23.063	25.906
<i>Age</i>	7241	13.938	6.582	2.000	14.000	27.000
<i>Size</i> ²	7241	535.818	56.618	419.996	531.886	671.100
<i>Indep</i>	7241	0.379	0.073	0.250	0.364	0.600
<i>Growth</i>	7241	0.198	0.464	-0.500	0.118	3.305
<i>Cash</i>	7241	0.146	0.109	0.011	0.118	0.550
<i>Expenditure</i>	7241	0.052	0.048	0.000	0.038	0.229
<i>Wcmi</i>	7241	-0.001	0.288	-0.660	-0.020	0.881

Table 2. Basic Regression between ESG and Financial Constraints

This table shows the results of the baseline regression between ESG and financial constraint for Chinese firms between 2010 and 2020. The dependent variable is the financial constraint that is measured by WW index and the main explanatory variable is *LnESG*. The whole sample is also divided into two groups based on sample year: one group is from 2010 to 2015 and the other one is from 2016 to 2020. Column (1) – (3) are the regressions with main explanatory variable (*LnESG*) and fixed effects (Industry and Year) only, and column (4) – (6) are the regressions including all variables. The coefficient difference of *LnESG* between sample year groups is also reported. The definitions of all variables are listed in Appendix 2. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Sample Year Group		All	Sample Year Group	
Variables	10-20	10-15	16-20	10-20	10-15	16-20
LnESG	-0.055*** (-14.260)	-0.037*** (-7.325)	-0.077*** (-12.961)	-0.006** (-2.563)	0.001 (0.297)	-0.015*** (-4.231)
Size				0.012 (0.727)	-0.010 (-0.406)	-0.025 (-1.031)
Age				0.001*** (9.328)	0.001*** (5.620)	0.001*** (8.346)
Size2				-0.001*** (-3.581)	-0.001 (-1.445)	-0.000 (-1.000)
Indep				-0.016** (-2.471)	-0.014 (-1.434)	-0.021*** (-2.578)
Growth				-0.006*** (-4.662)	-0.006*** (-3.220)	-0.005*** (-2.915)
Cash				-0.029*** (-4.673)	-0.014 (-1.565)	-0.040*** (-4.771)
Expenditure				-0.100*** (-8.728)	-0.071*** (-4.819)	-0.129*** (-7.308)
Wcmi				-0.017*** (-6.879)	-0.018*** (-4.810)	-0.018*** (-5.358)
Constant	-0.885*** (-70.803)	-0.941*** (-60.738)	-0.805*** (-39.305)	-0.652*** (-3.354)	-0.454 (-1.612)	-0.166 (-0.583)
Industry fixed	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,241	3,566	3,675	7,241	3,566	3,675
R-squared	0.149	0.120	0.165	0.661	0.637	0.686
Group diff.		0.041***			0.016***	

Table 3. Relation between ESG and Equity Issuance

This table shows the results of the regressions between ESG and equity issuance for Chinese firms between 2010 and 2020. The dependent variable is the equity issuance (EI) and the main explanatory variable is $\ln ESG$. The whole sample is divided into two groups based on sample year: one group is from 2010 to 2015 and the other one is from 2016 to 2020. Column (1) and (2) are the regressions with main explanatory variable ($\ln ESG$) and fixed effects (Industry and Year) only, and column (3) and (4) are the regressions including all variables. The coefficient difference of $\ln ESG$ between sample year groups is also reported. The definitions of all variables are listed in Appendix 2. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)
	Sample Year Group			
	10-15	16-20	10-15	16-20
LnESG	-0.028** (-2.169)	0.106*** (7.276)	-0.016 (-1.235)	0.113*** (7.225)
Size			-0.466*** (-5.274)	-0.048 (-0.736)
Age			-0.001 (-1.570)	-0.001** (-2.535)
Size2			0.010*** (5.082)	0.001 (0.650)
Indep			0.045 (1.277)	0.014 (0.574)
Growth			0.018*** (2.799)	0.006 (1.642)
Cash			-0.073** (-2.152)	0.012 (0.464)
Expenditure			0.156*** (2.594)	0.129*** (2.842)
Wcmi			-0.013 (-0.915)	0.008 (0.780)
Industry fixed	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
Constant	0.148*** (3.715)	-0.329*** (-6.660)	5.770*** (5.495)	0.282 (0.357)
Observations	3,566	3,675	3,566	3,675
R-squared	0.022	0.055	0.078	0.066
Group diff		-0.133***		-0.129***

Table 4. Relation between ESG and Debt Issuance

This table shows the results of the regressions between ESG and debt issuance for Chinese firms between 2010 and 2020. The dependent variable is the debt issuance (DI) and the main explanatory variable is $\ln\text{ESG}$. The whole sample is divided into two groups based on sample year: one group is from 2010 to 2015 and the other one is from 2016 to 2020. Column (1) and (2) are the regressions with main explanatory variable ($\ln\text{ESG}$) and fixed effects (Industry and Year) only, and column (3) and (4) are the regressions including all variables. The coefficient difference of $\ln\text{ESG}$ between sample year groups is also reported. The definitions of all variables are listed in Appendix 2. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)
	Sample Year Group			
	10-15	16-20	10-15	16-20
LnESG	-0.026*	0.057***	-0.018	0.051***
	(-1.657)	(4.249)	(-1.141)	(3.703)
Size			-0.210**	-0.082
			(-2.148)	(-1.096)
Age			-0.001*	-0.002***
			(-1.690)	(-4.047)
Size2			0.004**	0.002
			(2.104)	(1.125)
Indep			-0.027	0.016
			(-0.633)	(0.514)
Growth			0.035***	0.012**
			(4.058)	(2.227)
Cash			-0.109***	0.068**
			(-2.766)	(2.172)
Expenditure			0.471***	0.615***
			(6.671)	(8.739)
Wcmi			0.042***	0.008
			(2.600)	(0.700)
Industry fixed	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
Constant	0.176***	-0.133***	2.657**	0.809
	(3.642)	(-2.891)	(2.299)	(0.902)
Observations	3,566	3,675	3,566	3,675
R-squared	0.028	0.037	0.063	0.085
Group diff		-0.082***		-0.069***

Table 5. Relation between ESG and Financial Constraint for Non-SOE and SOE Groups

This table shows how the non-SOE and SOE feature affect the relation between ESG and financial constraint in China for sample year group 10-15 and 16-20, respectively. The dependent variable is the financial constraint that is measured by WW index and the main explanatory variable is *LnESG*. For each sample year group, the firms are further divided into two subsamples: one includes firms that are non-stated-owned and the other one includes firms that are stated-owned. The coefficient difference of *LnESG* between non-SOE and SOE subsamples for each sample year group is also reported. The definitions of all variables are listed in Appendix 2. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)	
	Sample Year				
	10-15		16-20		
Non-SOE	0.007 (1.404)	SOE	-0.001 (-0.308)	Non-SOE	-0.023*** (-4.624)
Size	0.005 (0.101)	SOE	-0.013 (-0.427)	Non-SOE	-0.016 (-0.464)
Age	0.001*** (4.071)	SOE	0.000** (2.454)	Non-SOE	0.001*** (8.164)
Size2	-0.001 (-1.064)	SOE	-0.001 (-1.086)	Non-SOE	-0.001 (-0.866)
Indep	-0.014 (-0.968)	SOE	-0.009 (-0.661)	Non-SOE	-0.027** (-2.330)
Growth	-0.006** (-2.064)	SOE	-0.005** (-2.010)	Non-SOE	-0.005* (-1.930)
Cash	0.005 (0.349)	SOE	-0.029*** (-2.700)	Non-SOE	-0.038*** (-3.477)
Expenditure	-0.042* (-1.898)	SOE	-0.087*** (-4.383)	Non-SOE	-0.140*** (-5.858)
Wcmi	-0.018*** (-3.318)	SOE	-0.018*** (-3.478)	Non-SOE	-0.014*** (-3.081)
Industry fixed	Yes	Yes	Yes	Yes	
Year fixed	Yes	Yes	Yes	Yes	
Constant	-0.627 (-1.142)	SOE	-0.402 (-1.155)	Non-SOE	-0.250 (-0.596)
Observations	1,545	SOE	2,021	Non-SOE	2,053
R-squared	0.574	SOE	0.675	Non-SOE	0.638
Group diff		0.009***		-0.022***	

Table 6. Relation between ESG and Equity Issuance for Non-SOE and SOE Groups

This table shows how the non-SOE and SOE feature affect the relation between ESG and financial constraint in China for sample year group 10-15 and 16-20, respectively. The dependent variable is the equity issuance (EI) and the main explanatory variable is $\ln ESG$. For each sample year group, the firms are further divided into two subsamples: one includes firms that are non-stated-owned and the other one includes firms that are stated-owned. The coefficient difference of $\ln ESG$ between non-SOE and SOE subsamples for each sample year group is also reported. The definitions of all variables are listed in Appendix 2. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)
	Sample Year			
	10-15		16-20	
Non-SOE		SOE	Non-SOE	SOE
LnESG	-0.031 (-1.405)	-0.011 (-0.684)	0.153*** (6.718)	0.062*** (3.048)
Size	-0.759*** (-4.336)	-0.337*** (-3.118)	-0.087 (-0.847)	0.025 (0.317)
Age	-0.001 (-0.885)	-0.000 (-0.669)	-0.001 (-1.205)	-0.001 (-1.120)
Size2	0.016*** (4.218)	0.007*** (2.993)	0.002 (0.772)	-0.001 (-0.337)
Indep	0.082 (1.341)	0.011 (0.258)	0.046 (1.275)	-0.039 (-1.265)
Growth	0.034*** (2.981)	-0.002 (-0.408)	0.004 (0.734)	0.007 (1.274)
Cash	-0.119** (-2.001)	-0.022 (-0.604)	0.015 (0.440)	0.021 (0.540)
Expenditure	0.233** (2.378)	0.086 (1.212)	0.089 (1.379)	0.121* (1.931)
Wcmi	-0.009 (-0.390)	-0.020 (-1.154)	-0.012 (-0.840)	0.031** (2.101)
Industry fixed	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
Constant	9.167*** (4.460)	4.216*** (3.285)	0.617 (0.502)	-0.451 (-0.468)
Observations	1,545	2,021	2,053	1,621
R-squared	0.108	0.051	0.085	0.045
Group diff	-0.020***		0.091***	

Table 7. Relation between ESG and Debt Issuance for Non-SOE and SOE Groups

This table shows how the non-SOE and SOE feature affect the relation between ESG and financial constraint in China for sample year group 10-15 and 16-20, respectively. The dependent variable is the debt issuance (DI) and the main explanatory variable is $LnESG$. For each sample year group, the firms are further divided into two subsamples: one includes firms that are non-stated-owned and the other one includes firms that are stated-owned. The coefficient difference of $LnESG$ between non-SOE and SOE subsamples for each sample year group is also reported. The definitions of all variables are listed in Appendix 2. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)
	Sample Year			
	10-15		16-20	
Non-SOE	Non-SOE	SOE	Non-SOE	SOE
LnESG	-0.021 (-0.790)	-0.021 (-1.070)	0.103*** (4.942)	-0.026* (-1.886)
Size	-0.422** (-2.190)	-0.076 (-0.651)	-0.206* (-1.678)	-0.019 (-0.225)
Age	-0.000 (-0.346)	-0.001 (-0.965)	-0.002*** (-3.265)	-0.000 (-0.251)
Size2	0.009** (2.203)	0.002 (0.626)	0.005* (1.740)	0.000 (0.229)
Indep	-0.079 (-1.178)	-0.019 (-0.328)	0.056 (1.209)	-0.047 (-1.191)
Growth	0.064*** (4.623)	-0.002 (-0.254)	0.009 (1.107)	0.008 (1.181)
Cash	-0.132** (-1.997)	-0.055 (-1.194)	0.057 (1.258)	0.060 (1.515)
Expenditure	0.563*** (5.178)	0.353*** (4.052)	0.621*** (6.486)	0.385*** (4.556)
Wcmi	0.065*** (2.615)	0.003 (0.164)	-0.002 (-0.100)	0.027** (2.094)
Industry fixed	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
Constant	5.019** (2.232)	1.079 (0.776)	2.009 (1.377)	0.347 (0.346)
Observations	1,545	2,021	2,053	1,621
R-squared	0.095	0.050	0.108	0.068
Group diff	-0.001***		0.129***	

Table 8. Relation between ESG and Financial Constraint for Low- and High-Pollution Groups

This table shows how the pollution feature affect the relation between ESG and financial constraint in China for sample year group 10-15 and 16-20, respectively. The dependent variable is the financial constraint that is measured by WW index and the main explanatory variable is $\ln\text{ESG}$. For each sample year group, the firms are further divided into two subsamples: one includes firms that has low pollution and the other one includes firms that has high pollution. The coefficient difference of $\ln\text{ESG}$ between low-pollution and high-pollution subsamples for each sample year group is also reported. The definitions of all variables are listed in Appendix 2. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)
	Sample Year			
	10-15		16-20	
LnESG	0.005 (1.161)	-0.004 (-0.709)	-0.013*** (-2.988)	-0.021*** (-4.262)
Size	-0.007 (-0.231)	-0.027 (-0.720)	-0.033 (-1.226)	0.012 (0.252)
Age	0.001*** (6.656)	0.000 (1.055)	0.001*** (9.120)	0.000 (1.532)
Size2	-0.001 (-1.202)	-0.000 (-0.447)	-0.000 (-0.617)	-0.001 (-1.200)
Indep	-0.011 (-0.942)	-0.011 (-0.621)	-0.024** (-2.473)	-0.010 (-0.632)
Growth	-0.006*** (-2.730)	-0.006* (-1.695)	-0.003 (-1.571)	-0.011*** (-3.312)
Cash	-0.028** (-2.496)	0.016 (1.083)	-0.046*** (-4.557)	-0.022 (-1.513)
Expenditure	-0.046** (-2.500)	-0.105*** (-4.240)	-0.083*** (-4.089)	-0.187*** (-6.159)
Wcmi	-0.001 (-0.242)	-0.042*** (-6.791)	-0.018*** (-4.136)	-0.020*** (-3.754)
Industry fixed	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
Constant	-0.503 (-1.377)	-0.224 (-0.507)	-0.062 (-0.194)	-0.605 (-1.051)
Observations	2,202	1,364	2,514	1,159
R-squared	0.655	0.633	0.704	0.658
Group diff	0.009***		0.008***	

Table 9. Relation between ESG and Equity Issuance for Low- and High-Pollution Groups

This table shows how the pollution feature affect the relation between ESG and equity issuance in China for sample year group 10-15 and 16-20, respectively. The dependent variable is the equity issuance (EI) and the main explanatory variable is $\ln ESG$. For each sample year group, the firms are further divided into two subsamples: one includes firms that has low pollution and the other one includes firms that has high pollution. The coefficient difference of $\ln ESG$ between low-pollution and high-pollution subsamples for each sample year group is also reported. The definitions of all variables are listed in Appendix 2. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)
	Sample Year			
	10-15		16-20	
LnESG	-0.027 (-1.579)	0.007 (0.328)	0.089*** (4.819)	0.161*** (5.334)
Size	-0.478*** (-4.178)	-0.473*** (-3.279)	-0.016 (-0.201)	-0.172 (-1.277)
Age	-0.002** (-2.422)	0.001 (1.258)	-0.001*** (-2.744)	-0.000 (-0.356)
Size2	0.010*** (4.023)	0.010*** (3.148)	0.000 (0.147)	0.003 (1.224)
Indep	0.066 (1.410)	0.020 (0.369)	0.013 (0.448)	0.003 (0.070)
Growth	0.013 (1.577)	0.020** (2.043)	0.009** (1.964)	0.003 (0.568)
Cash	-0.082* (-1.916)	-0.049 (-0.884)	0.041 (1.311)	-0.059 (-1.309)
Expenditure	0.171** (2.153)	0.121 (1.306)	0.111** (2.004)	0.141* (1.867)
Wcmi	-0.015 (-0.807)	-0.029 (-1.297)	-0.015 (-1.256)	0.053*** (2.706)
Industry fixed	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
Constant	5.963*** (4.363)	5.763*** (3.393)	-0.036 (-0.038)	1.587 (1.016)
Observations	2,202	1,364	2,514	1,159
R-squared	0.094	0.080	0.063	0.089
Group diff	-0.034***		-0.072***	

Table 10. Relation between ESG and Debt Issuance for Low- and High-Pollution Groups

This table shows how the pollution feature affect the relation between ESG and debt issuance in China for sample year group 10-15 and 16-20, respectively. The dependent variable is the debt issuance (DI) and the main explanatory variable is $LnESG$. For each sample year group, the firms are further divided into two subsamples: one includes firms that has low pollution and the other one includes firms that has high pollution. The coefficient difference of $LnESG$ between low-pollution and high-pollution subsamples for each sample year group is also reported. The definitions of all variables are listed in Appendix 2. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)
	Sample Year			
	10-15		16-20	
LnESG	-0.038*	0.011	0.024	0.109***
	(-1.790)	(0.434)	(1.363)	(4.887)
Size	-0.296**	-0.056	-0.116	-0.014
	(-2.349)	(-0.347)	(-1.283)	(-0.096)
Age	-0.001	-0.001	-0.002***	-0.001*
	(-0.951)	(-1.437)	(-3.445)	(-1.904)
Size2	0.006**	0.001	0.003	0.000
	(2.325)	(0.304)	(1.343)	(0.050)
Indep	-0.071	0.027	-0.029	0.118*
	(-1.292)	(0.376)	(-0.773)	(1.947)
Growth	0.046***	0.017	0.009	0.021**
	(3.823)	(1.555)	(1.466)	(1.987)
Cash	-0.084*	-0.124**	0.084**	0.034
	(-1.663)	(-2.046)	(2.155)	(0.637)
Expenditure	0.439***	0.561***	0.556***	0.718***
	(4.687)	(5.204)	(6.906)	(5.459)
Wcmi	0.030	0.037	0.003	0.009
	(1.397)	(1.492)	(0.213)	(0.487)
Industry fixed	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
Constant	3.742**	0.756	1.275	-0.158
	(2.491)	(0.401)	(1.181)	(-0.095)
Observations	2,202	1,364	2,514	1,159
R-squared	0.067	0.075	0.085	0.113
Group diff	-0.049***		-0.085***	