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Corporate Social Responsibility and Maturity Mismatch of Investment and Financing: Evidence from Polluting and Non-Polluting Companies

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Received: 22 May 2020; Accepted: 16 June 2020; Published: 18 June 2020



Abstract: We investigate the influence of corporate social responsibility (CSR) on the maturity mismatch of investment and financing from the perspective of both polluting and non-polluting companies. The results reveal that CSR performance can aggravate the maturity mismatch of investment and financing; and the effect can be more serious in the polluting companies. At the same time, we find that CSR makes companies obtain more short-term debt. What is more, polluting companies perform more environmental responsibilities in the form of long-term investments than non-polluting companies. These phenomena exacerbate the maturity mismatch of investment and financing; and this effect is only significant when polluting companies choose CSR mandatory disclosure. The impact of CSR on the maturity mismatch of investment and financing is more apparent in companies with lower value and at smaller scales. We show that companies should not only perform their CSR to maintain a balanced economic and ecological development, but also pay attention to the aggravation of the maturity mismatch of investment and financing.

Keywords: corporate social responsibility; maturity mismatch of investment and financing; polluting company

1. Introduction

In recent years, the world's largest emerging economy, China, has made remarkable achievements in the field of economic development. However, the operation mode whereby companies gain economic benefits at the expense of the environment brings great harm to society; this is especially true of polluting companies. Thus, corporate social responsibility (CSR) has been given widespread attention. The Chinese Government attaches great importance to the preservation and management of CSR, and has promulgated a series of policies to promote CSR performance. On the one hand, corporate behaviors are strictly regulated by these policies to prevent harm to society. On the other hand, companies are encouraged to actively perform CSR. The literature suggests that CSR can alleviate

financing constraints [1–7] and improve investment efficiency [8–10]. Combined with these views, CSR may alleviate the degree of maturity mismatch of investment and financing. Thus, CSR can make the capital chain of companies more secure. Nevertheless, research shows that CSR will shorten the capital maturity structure and induce overinvestment [11,12]. Furthermore, these consequences may induce maturity mismatch of investment and financing, and companies have to use short-term loans to support long-term investment. The maturity mismatch of investment and financing aggravates the liquidity risk of companies [13] and reduces their innovation ability [14]. The sustainable development of companies could be hampered by a series of financial problems caused by this mismatch. In this context, the relation between CSR and investment and financing has not yet been clarified. How to adhere to the implementation of national policies and guidelines, actively perform CSR and avoid the dilemma of the maturity mismatch of investment and financing have become urgent problems for companies to solve. Therefore, it is necessary to study the influence of CSR on the maturity mismatch of investment and financing.

There has been abundant research on the relation between CSR and corporate investment and financing. As for the relation between CSR and corporate financing, it has been found that CSR mandatory disclosure can help alleviate the asymmetry of information related to political and social risks. This information can bring more financial resources to companies [1–3,15]. Moreover, performing CSR can reduce the probability of default [13], significantly improve the corporate credit rating and lowering the loan interest rate [5–7]. But other studies have found that performing CSR can also shorten the maturity of debt [16], which may increase liquidity risk. As for the relation between CSR and investment, studies have found that CSR can improve investment efficiency [8,10]. However, the improvement effect is limited, Hung et al. (2013) [15] and Yang (2019) [17] found that CSR mandatory disclosure significantly alleviated companies' underinvestment when their financing constraints were high. Although research on the relation between CSR and corporate financing and between CSR and corporate investment has been relatively abundant, scholars have studied the two relations in isolation and have not combined them. The de facto association between CSR and activities of investment and financing still cannot be identified.

In fact, the investment and financing activities of companies are closely connected as a whole. If the company's capital cannot be reasonably utilized for appropriate investment activities, then it will lead to a maturity mismatch of investment and financing, that is, "Corporate Long-term Investment with Short-term Financing". Secondly, as the Chinese government has been improving ecological governance in recent years, a series of environmental protection policies have been promulgated to force polluting companies that are highly dependent on environmental resources to fulfill their environmental responsibilities. The investment and financing activities of polluting companies have been greatly affected by these compliance pressures. As the maturity mismatch of investment and financing is affected by both investment and financing, the heterogeneity between polluting and non-polluting companies may play an important role in the impact of CSR performance on the maturity mismatch of investment and financing.

Could CSR performance affect the maturity mismatch of investment and financing? Through which mechanisms? And how does this effect differ between polluting and non-polluting companies? This paper uses a fixed effect model and Rankings CSR Ratings (RKS) data from 2009 to 2018 to study the above problems. The empirical results suggest that the CSR performance can aggravate the maturity mismatch of investment and financing, and the mismatch is more serious in polluting companies. Through the mechanism test, we find that CSR performance enables non-polluting companies to obtain more short-term financing. What is more, polluting companies are forced to perform their environmental responsibility under compliance pressure. These phenomena exacerbate the maturity mismatch of investment and financing. We examine the heterogeneous influence of CSR disclosure intention and find that CSR performance has a greater impact on the maturity mismatch of investment and financing when polluting companies choose mandatory disclosure. Finally, we also explore the role played by the heterogeneity of company value and company size in the relation between them

and find that the impact of CSR on the maturity mismatch of investment and financing is starker in the company with lower value and at a smaller scale.

At present, there is still no clear relation between CSR and the maturity mismatch of investment and financing. Our research motivation lies in our attempt to identify the relationship between CSR and the maturity mismatch of investment and financing. Moreover, in the context of China's increasing emphasis on ecological governance, we try to identify the heterogeneity between polluting and non-polluting companies. We expect that our research conclusions can provide practical advice to business operators on how to find the balance between CSR fulfillment and the maturity mismatch of investment and financing, to policy makers on how to mitigate the negative effects of CSR and to investors on how to identify high risks.

Previous literature isolated studies on the relation between CSR and investment or financing and did not identify the true relation between CSR and the maturity mismatch of investment and financing. The difference between this paper and existing research is mainly reflected in that we comprehensively consider the investment activities and financing activities of companies and study the impact of CSR on the maturity mismatch of investment and financing. In addition, we examine the relation between CSR and the maturity mismatch of investment and financing from the perspective of polluting companies and non-polluting companies. Further, we also examine the influence of the heterogeneity of disclosure intention and company characteristics on this relation, which enrich the relevant research on the relation between CSR and the maturity mismatch of investment and financing.

2. Literature Review and Hypothesis Development

2.1. A Literature Review on the Maturity Mismatch of Investment and Financing

Maturity mismatch of investment and financing refers to a type of phenomena in which companies use short-term loans to support long-term investment, also known as "Corporate Long-term Investment with Short-term Financing". At present, the theoretical explanations for the formation of the maturity mismatch of investment and financing mainly include the "Capital Cost Hypothesis" and the "Alternative Choice Hypothesis". The "Capital Cost Hypothesis" argues that the formation happens because the cost of short-term debt is low and high-quality companies are able to cope with the liquidity risk of short-term debt, whereas the "Corporate Long-term Investment with Short-term Financing" strategy is chosen by companies [18,19]. However, the "Alternative Choice Hypothesis" assumes that the long-term borrowing needs of companies cannot be met under a system environment of financial repression. In the context of finance repression, companies are forced to use short-term debt for long-term investment [13,20,21].

Generally speaking, there are three conditions for the supply of long-term funds. First, the multi-level financial market structure can provide diversified financing channels for companies. Second, there exists a reasonable credit spread between long-term and short-term funds. A reasonable credit spread can provide the necessary premium for long-term funds to compensate the liquidity preference of fund suppliers [22,23]. Third, the orderliness and stability of the financial market can facilitate long-term transactions between the supply and demand of funds [24]. However, Bai (2016) [20] found that the development of China's multi-level financial market structure is not perfect enough, by comparing the financial systems of China and the U.S. In addition, the gap of interest rates between short-term and long-term funds in China is relatively narrow. The narrow credit spread is unable to provide reasonable premium compensation for long-term fund suppliers. Moreover, as China's monetary policy is characterized by violent fluctuations, banks find it difficult to establish stable expectations. Therefore, their lending tends to be short-term in order to avoid risks. Using the PSM(propensity score matching) and DID(difference-in-differences estimation), Qiu and Bai (2019) found that official visits increased the maturity mismatch of investment and financing [25]. They argued that this is mainly because officials inspire overconfidence in management. Shen et al. (2019) found that the investment activities of state-owned companies depend on short-term debt, and there is a

problem of maturity mismatch of investment and financing in the companies [26]. Sun (2019) compared institutional defects and managers' irrationality and found that institutional defects were the main cause of the maturity mismatch of investment and financing [27]. These findings show that the maturity mismatch of investment and financing of Chinese companies is mainly affected by institutional factors. This means that the long-term capital needs of Chinese companies are not satisfied. Hence, the maturity mismatch of investment and financing in the context of China is more consistent with the "Alternative Choice Hypothesis" [20].

From the China Stock Market and Accounting Research (CSMAR) database, we collected the total new long-term debt and total new short-term debt of all Chinese A-share listed companies from 2009 to 2018, as shown in Figure 1. This shows that the annual total of new long-term debt is generally lower than the annual total of new short-term debt (with the exception of 2009, 2013 and 2016). It also shows that the supply of long-term funds in the Chinese market is restrained.

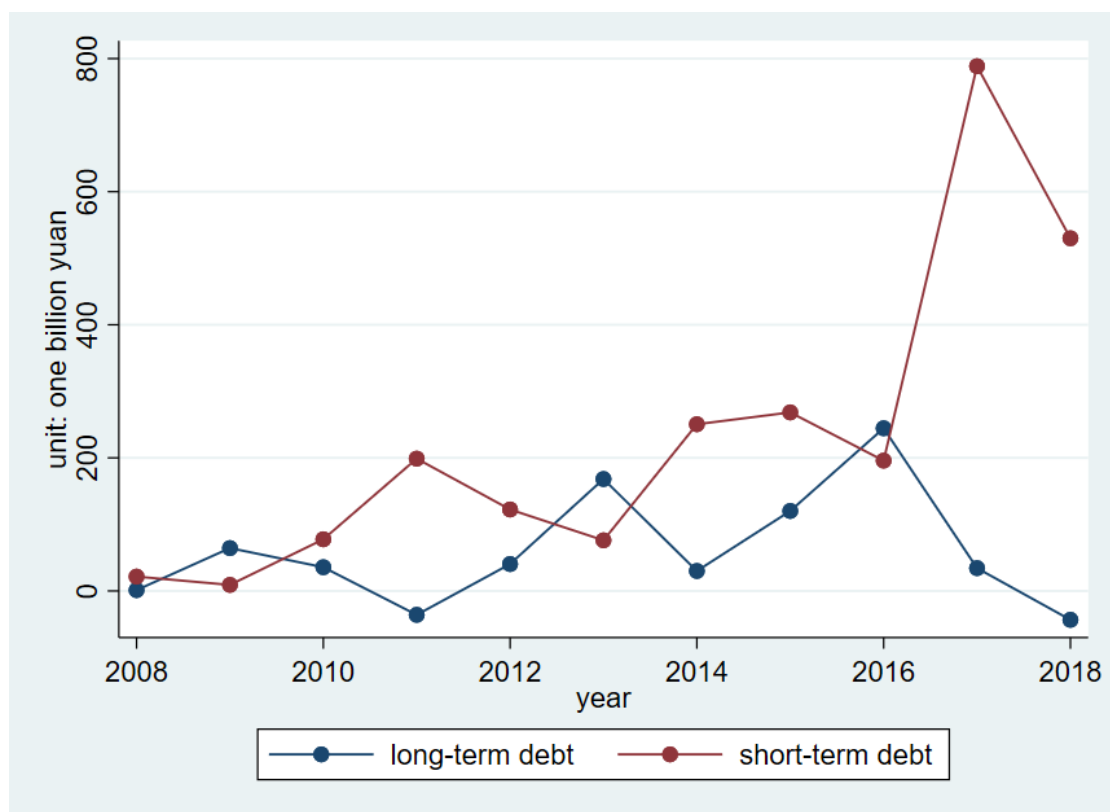


Figure 1. New long-term debt and new short-term debt.

2.2. A Literature Review on CSR

As for the relation between CSR and financing activities, scholars argue that companies with good CSR performance send the message to the outside world that they have higher stability and a lower perception of risk [16]. Specifically, good CSR performance means lower market risk, lower litigation risk and lower credit risk [5–7,13,23]. Du (2007) found that the good reputation brought by CSR performance could reduce the price sensitivity and improve the brand loyalty of consumers [28]. Oikonomou et al. (2012) found that companies with good CSR performance were less likely to be penalized and sued, and were faced with looser regulations [29]. Feng (2016) found that fulfilling CSR could reduce the probability of default [4]. Chen and Lin (2017) found that a company with good CSR performance had a higher corporate credit rating [6]. Xie and Li (2019) indicated that there was a negative correlation between CSR and loan interest rate [7]. Moreover, Yuan (2020) indicated that CSR activities promoted the interaction between companies and stakeholders [30]. Further,

Liu and Liu (2019) found that CSR could alleviate financing constraints by enhancing regional social trust [31]. What is more, Ruan and Guan (2019) found that CSR performance could increase social capital, and, thus, alleviate the financing constraints of companies [32]. CSR behavior has an information effect and brings more financial resources to companies [1–3,15]. Therefore, CSR performance can improve the availability of loans, which greatly alleviates the financing constraints. But the authors did not take into account the maturity of these financial resources. Bai et al. (2016) and Zhong et al. (2018) found that corporate long-term investment with short-term financing could only alleviate the urgent need for investment, but increased the risk of a potential collapse of the corporate capital chain [13,20]. Some scholars also considered the maturity of funds and found that fulfilling CSR can also shorten the maturity of debt [16]. Nevertheless, it is also unclear whether companies will scale back their long-term investments to match the maturity of their financing under shorter debt maturity.

As for the relationship between CSR and investment, Huang and Xu (2017) and Hong (2019) have found that CSR can improve investment efficiency [8,10]. However, the impact is limited. Yang et al. (2019) and Hung et al. (2013) argued that this effect can only significantly alleviate the underinvestment of companies with financing constraints, but it has no obvious effect on companies with lower financing constraints [15,17]. These studies confirm the positive effect of CSR on investment efficiency. However, Hemingway and Maclagan (2004) and Quan et al. (2015) found that CSR could also lead to overinvestment [11,12]. Zhao et al. (2018) also found that CSR could raise the level of investment [9]. The reason for these two contrasting conclusions may be that academics fail to take into account the financing activities of companies. As the investment and financing activities of a company are closely related, managers must take the financing situation into consideration when making investment decisions. Companies with high financing constraints have fewer financial resources. This will inevitably lead to insufficient investment in the case of lack of funds. On the other hand, companies can obtain more financial resources by fulfilling their social responsibilities, and this may boost their investment levels. In other words, CSR can improve investment efficiency [8,10]. For companies with low financing constraints, the investment level is already very high, while CSR brings more financial resources, which may lead to further overinvestment. However, scholars still have not considered the relation between investment maturity and financing maturity comprehensively. The improvement of investment efficiency may be accompanied by the maturity mismatch of investment and financing, but excessive investment does not necessarily lead to the maturity mismatch of investment and financing.

2.3. Hypothesis Development

2.3.1. CSR and the Maturity Mismatch of Investment and Financing

Based on signaling theory, companies with good CSR performance transmit to the outside world that they have higher stability and a lower perception of risk—in particular, lower market risks, litigation risks and credit risks, as highlighted in several previous studies [33,34]. These companies have higher credit rating and social reputation and, thus, are more likely to obtain loans from banks. Based on the existing literature, CSR performance could reduce the market risk. Specifically, the good reputation brought by CSR performance could reduce the price sensitivity and improve the brand loyalty of consumers [28]. CSR performance can also help companies effectively avoid compliance risks. Oikonomou et al. (2012) [29] found that companies with good CSR performance were less likely to be penalized and sued, and were faced with looser regulations. They also maintained more stable relationships with the government and financial institutions. Moreover, Attig et al. (2013) [34] emphasized that companies with good CSR performance have lower credit risks. Rating agencies are more likely to evaluate the credit reliability of companies based on their non-financial information, like CSR reports. Therefore, CSR performance can improve the loan availability to companies. However, when providing loans, commercial banks mainly examine the liquidity risk of companies and pay attention to the assessment of companies' solvency. Good CSR performance signals the lower credit

risk of current companies, but it cannot attest to their long-term solvency. A way to ensure a stable reputation is to perform CSR over a long period of time. Such long-term CSR performance will also occupy the company's capital, and, thus, incur strains on its cash flow [30,35,36]. Therefore, from the supply side, and in combination with the alternative choice hypothesis, commercial banks are more likely to provide more short-term loans to companies with good CSR performance. Meanwhile, from the demand side, Chinese companies, especially small and medium-sized companies, may be more inclined to short-term debt financing in order to cut financing costs. They realize long-term capital occupation through the continuous rolling of short-term debt [20]. Therefore, from both the demand side and the supply side, although various studies have shown that CSR can alleviate financing constraints [1–7], it is still difficult for companies with high CSR performance to obtain more long-term loans, due to the lagging development of China's financial market. Based on the "Alternative Choice Hypothesis", as the demand of companies for long-term funds cannot be satisfied, "Corporate Long-term Investment with Short-term Financing" has become the alternative. In this case, the maturity mismatch of investment and financing is further aggravated [20]. Based on the above arguments, we propose our first hypothesis as follows:

Hypothesis 1. *CSR performance aggravates the maturity mismatch of investment and financing.*

2.3.2. Heterogeneity between Polluting and Non-Polluting Companies

Due to the differences in the characteristics of companies and the policy background of China, there also exist differences between polluting and non-polluting companies in the impact of CSR performance on the maturity mismatch of investment and financing. In addition, their impact mechanisms are also different. From the perspective of the different characteristics of companies, the most polluting companies are industrial companies that rely heavily on natural resources. Their fixed assets account for a large proportion of their total assets. Moreover, compared with non-polluting companies, polluting companies are subject to more environmental regulation and have higher legal and litigation risks due to their serious damage to the environment. All these characteristics indicate that the operating risk of polluting companies is relatively high and their profitability is generally not strong. From the perspective of policy background, the Chinese government has increasingly attached importance to ecological governance and linked companies' environmental performance to credit conditions. The "green credit" policy was promulgated in December 2007. Since the launch of this policy, banks regard compliance with environmental testing standards, pollution control effects and ecological protection as important prerequisites for credit approval. If polluting companies insist on ignoring environmental responsibility, then their financing activities will be severely restricted. As such, companies are enforced to internalize pollution costs and achieve the goal of prior control. Therefore, compared with non-polluting companies, polluting companies have to allocate more resources to environment protection. They are forced to promote their environmental responsibility performance by stimulating technological innovation, carrying out industrial transformation and investing in environmental protection, in order to improve credit availability [37]. As these environmental protection investments are long-term investments, the maturity mismatch of investment and financing of polluting companies can be aggravated. To sum up, in terms of the impact mechanism of CSR performance on the maturity mismatch of investment and financing, the significant difference between polluting companies and non-polluting companies may be that polluting companies make more long-term investments on environmental social responsibility than non-polluting companies. Thus, given the premise of maintaining bank credit availability, the maturity mismatch of investment and financing may be more serious when polluting companies perform more CSR. Based on this discussion, the second hypothesis of this paper is as follows:

Hypothesis 2. *Compared with non-polluting companies, the effect of CSR performance on the maturity mismatch of investment and financing is more serious for polluting companies.*

3. Research Design

3.1. Sample Selection and Data Sources

As a result of the covid-19 outbreak, the annual report disclosures of China's A-share listed companies have been delayed. Since the financial data of A-share listed companies in 2019 is missing, the study sample consists of Shanghai and Shenzhen A-share listed companies from 2009 to 2018. The raw data was processed as per the following rules:

- (1) Due to the abnormal financial situation of special treatment (ST) companies, we excluded listed companies marked as S, ST, *ST, SST and S* ST to ensure comparability of the data.
- (2) All missing samples of financial indicators (including the sample of corporate social responsibility rating index not disclosed in the Rankings CSR Ratings (RKS) database) were excluded from the sample.
- (3) The financial structure of companies in the financial industry is quite different from that of other industries. In order to improve the comparability of the data, financial companies were excluded from the sample.
- (4) The continuous variables were winsorized on the 1% and 99% quantile. This led to a final sample of 824 companies with an unbalanced panel of 4281 firm year observations.

The data sources were as follows:

- (1) The CSR score data in this paper is from the Rankings (RKS) CSR Ratings database.
- (2) Other data used in the research process are from the China Stock Market and Accounting Research (CSMAR) database.

STATA software 15.0 was used for processing in the empirical study.

3.2. Variable Definition

3.2.1. The Dependent Variable

Following Frank et al. (2014) [38], Ma et al. (2018) [21] and Xiao and Li (2019) [39], we measured the maturity mismatch of investment and financing (Mis) by the following formula:

$$\text{Mis} = [\text{Cash expenditure on investment activities such as the purchase and construction of fixed assets} - (\text{increase of long-term loans in the current period} + \text{increase of equity in the current period} + \text{net operating cash flow in the current period} + \text{cash flow from the sale of fixed assets})] \div \text{the total assets.}$$

3.2.2. The Independent Variables

As we highlight above, we used data provided by Rankings CSR Ratings (RKS) as a proxy for CSR. RKS is an extra-financial rating agency providing research and consulting services related to social responsibility. It adopts the structured expert scoring method, with a full mark of 100.

As to whether a company is a polluting company (Pollute) or not, we identified 16 industries as polluting based on the "Guidelines on Environmental Information Disclosure for Listed Companies" of the Ministry of Environmental Protection of China, including thermal power, steel, cement, electrolytic aluminum, coal, metallurgy, chemical, petrochemical, building materials, paper making, brewing, pharmaceutical, fermentation, textile, leather and mining industries. Polluting companies were assigned the number 1, while others were marked with 0.

3.2.3. The Other Variables

In line with the previous studies [37–40], leverage, firm size, company growth, Tobin's Q value, majority shareholder, the first major shareholder shareholding ratio, board size, the duality of chairman and CEO, independent director ratio, the intention of voluntary disclosure, property rights, the number of years that a company goes public and other variables that may affect the investment and financing

behavior of the company—such as industry and year—were used as the control variables. The specific variable definition is shown in Table 1.

Table 1. Variable definitions.

Variable Categories	Variable Name	Symbol	Definition
Major Variable	Maturity mismatch of investment and financing	Mis	Refer to above
	CSR performance	CSR	Refer to above
	Polluting firm	Pollute	Refer to above
Control Variables	Leverage	Lev	Total assets/total liabilities
	Size	Size	The natural logarithm of the total assets
	Growth	Growth	Current operating income/(current operating income-previous operating income)
	Majority Shareholder	First	Percentage of shares held by the largest shareholder
	Board size	Dsize	Number of board members
	CEO Duality	Dual	1 if the chairman and CEO are the same person, 0 otherwise
	Proportion of independent director	Rind	The proportion of independent directors in the board of directors
	Voluntary disclosure	Will	Dummy variable, if the voluntary disclosure of CSR report is 1, otherwise 0
	Property rights	Seo	1 if the company is state-owned, otherwise 0.
	The firm's age	Age	Number of years of establishment
	Tobin's Q	Tobinq	Lagged Tobin's Q
Money supply	M1	M1 = cash in circulation + demand deposits of companies + deposits of government organs, organizations and troops + deposits of rural areas + credit card deposits held by individuals.	

3.3. Model Setting

In line with the previous studies [38,40], the following regression model was employed to empirically test the impact of CSR on the maturity mismatch of investment and financing:

$$\text{Mis}_{i,t} = \beta_0 + \beta_1 \text{CSR}_{i,t-1} + \sum \beta_j \text{Controls}_{i,t} + \varepsilon_{i,t} \quad (1)$$

In Equation (1), i represents company i and t represents period t . Considering the time delay of the impact of CSR performance on the maturity mismatch of investment and financing and reducing the endogenous generated by the reverse causal relation between them, the lead time factor was added to CSR performance in Equation (1). CSR_{t-1} represents CSR performance last year. Since the issue of whether the company belongs to a polluting or non-polluting industry is fixed, the Pollute join lead time factor did not affect the test results. Controls is a control variable, as detailed in Table 1.

4. Empirical Results

4.1. Descriptive Statistics of Variables

Table 2 provides descriptive statistical results for the variables in this paper. As can be seen from the table, the minimum value of investment and financing maturity mismatch (Mis) is -0.55 , the maximum value is 19.46 and the standard deviation is 2.25 , indicating that the sample companies have significant differences in the maturity mismatch of investment and financing. The standard deviation of social responsibility (CSR) is 11.98 , indicating a strong numerical dispersion. The average value of disclosure intention (Will) is 0.34 , and the median value is 0 , indicating that the disclosure

intention of companies is generally not strong. Next, regression analysis was carried out according to this sample.

Table 2. Descriptive statistics.

	Count	Mean	Sd	Min	P50	Max
Mis	4281	0.38	2.25	−0.55	−0.02	19.46
CSR	4281	38.18	11.98	18.65	35.60	75.45
Pollute	4281	0.312	0.46	0.00	0.00	1.00
Lev	4281	0.50	0.20	0.07	0.51	0.89
Size	4281	23.13	1.44	20.40	23.00	27.08
Growth	4281	0.14	0.30	−0.48	0.10	1.57
First	4281	38.45	15.98	7.85	38.25	76.00
Dsize	4281	9.26	1.95	5.00	9.00	15.00
Dual	4281	0.16	0.37	0.00	0.00	1.00
Rind	4281	0.38	0.06	0.30	0.36	0.60
Will	4281	0.35	0.48	0.00	0.00	1.00
Seo	4281	0.66	0.48	0.00	1.00	1.00
Age	4281	16.11	5.34	1.00	16.00	37.00
Tobinq	4281	1.79	1.07	0.85	1.43	7.04
M1	4281	0.58	0.49	0.00	1.00	1.00

4.2. Regression Analysis

Before the regression analysis of Equation (1), we tested the stationarity of the panel data. We performed a fisher type unit root test for each continuous variable, and the results showed that the panel data were stationary (Mis, $\text{chi}2 = 1.05 \times 10^4$, $p = 0.0000$; CSR, $\text{chi}2 = 3752.3009$, $p = 0.0000$; Lev, $\text{chi}2 = 1986.0548$, $p = 0.0000$; Size, $\text{chi}2 = 3627.1712$, $p = 0.0000$; Growth, $\text{chi}2 = 3807.5364$, $p = 0.0000$; First, $\text{chi}2 = 1718.4418$, $p = 0.0000$; Dsize, $\text{chi}2 = 1323.59$, $p = 0.0414$; Rind, $\text{chi}2 = 2722.0809$, $p = 0.0000$; Tobinq, $\text{chi}2 = 3293.9245$, $p = 0.0000$; M1, $\text{chi}2 = 1427.1891$, $p = 0.0001$). In order to control the individual heterogeneity of the sample companies, we estimated Equation (1) using a fixed effect model. We tested the rationality of using a fixed effect model by conducting a Hausman test on Equation (1). Since the test results rejected the null hypothesis of random effect ($\text{chi}2 = 162.38$, $p = 0.0000$), it was appropriate to use the fixed effect model in this paper. Results are reported in Table 3. All reported z- or t-values are on an adjusted basis using robust standard errors corrected for firm-level clustering and heteroscedasticity (the same as below).

Column (1) in Table 3 shows the result of the impact of CSR on the maturity mismatch of investment and financing (Mis) in the total sample. The coefficient on $\text{CSR}_{i,t-1}$ is positive and significant (0.0204, $t = 2.90$) when we used $\text{Mis}_{i,t}$ as the dependent variable. This result preliminarily supports our hypothesis that CSR performance will aggravate the maturity mismatch of investment and financing. Column (2) and column (3) in Table 3 are the grouping regression results based on whether the company is a polluting company. The regression results all show that the coefficient on $\text{CSR}_{i,t-1}$ is positive and significant (0.0243, $t = 2.28$; 0.0225, $t = 2.39$) when we use $\text{Mis}_{i,t}$ as the dependent variable. In addition, the absolute value of the coefficient on $\text{CSR}_{i,t-1}$ in column (2) is greater than that in column (3). These results indicate that CSR performance by polluting companies intensifies the mismatch of investment and financing terms more seriously. This empirical outcome also supports Hypothesis 2.

4.3. The Mechanism of CSR Performance on the Maturity Mismatch of Investment and Financing

The empirical results above indicate that CSR performance significantly aggravates the maturity mismatch of investment and financing. Based on our theoretical analysis, the reason for the existence of these phenomena may be that CSR performance enables companies to obtain more short-term capital, but cannot increase long-term capital. In addition, CSR performance can also increase the long-term investment of companies. Moreover, the empirical results suggest that the implementation of CSR by polluting companies aggravates the maturity mismatch of investment and financing to a greater extent,

which may be the result of polluting companies being forced to make more environmental investments under more environmental regulations.

Table 3. CSR and maturity mismatch of investment and financing.

	(1) The Total Sample	(2) Polluting Industries	(3) Non-Polluting Industries
	Mis	Mis	Mis
CSR	0.0204 *** (2.90)	0.0243 ** (2.28)	0.0225 ** (2.39)
Lev	0.354 (0.56)	1.208 (1.28)	−0.289 (−0.33)
Size	−0.0230 (−0.11)	0.233 (0.57)	−0.0974 (−0.44)
Growth	−0.115 (−0.99)	0.00149 (0.01)	−0.157 (−1.05)
First	0.0161 ** (2.04)	0.00813 (0.61)	0.0201 ** (2.16)
Dsize	0.0123 (0.24)	0.0484 (0.60)	−0.0191 (−0.30)
Dual	−0.0521 (−0.34)	−0.265 (−0.98)	0.0726 (0.43)
Rind	−1.721 (−1.46)	−0.349 (−0.19)	−2.355 (−1.54)
Will	0.536 *** (3.13)	0.194 (1.35)	0.755 *** (2.92)
Seo	−0.679 (−0.81)	−0.137 (−0.08)	−0.828 (−0.86)
Age	−0.535 *** (−8.57)	−0.522 *** (−4.81)	−0.546 *** (−7.09)
Tobinq	−0.0426 (−0.52)	0.000395 (0.00)	−0.0745 (−0.69)
M1	−0.521 *** (−7.25)	−0.499 *** (−4.72)	−0.525 *** (−5.66)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
_cons	7.200 (1.62)	−1.762 (−0.19)	10.17 ** (2.04)
R2	0.189	0.234	0.181
adj. R2	0.178	0.212	0.166
n	4281	1461	2820

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.3.1. The Impact Path of Short-Term Financing

In our theoretical analysis, we argue that the alternative choice effect of companies performing CSR only allows them to obtain more short-term capital. This consequence induces the aggravation of the maturity mismatch of investment and financing. In order to examine the above analysis, Equation (2) was constructed as follows:

$$SDebt_{i,t} = \beta_0 + \beta_1 CSR_{i,t-1} + \beta_2 Inv_{i,t} + \sum \beta_j Controls_{i,t} + \varepsilon_{i,t} \quad (2)$$

SDebt represents short-term financing. Its specific calculation method is: net increase in short-term financing ÷ (net increase in short-term financing + net increase in long-term financing) × 100%. The net increase in short-term financing was calculated by subtracting the increase in cash from the increase in short-term borrowing for the current year. The specific calculation method of the net increase in long-term financing is: (current increase in long-term loan + current increase in equity + current net operating flow + cash inflow from selling fixed assets).

Equation (2) was estimated using a fixed effect model to test the role played by CSR in short-term financing. In addition, in order to exclude the impact of corporate investment on the short-term financing of companies, we controlled for the newly increased investment (Inv) in the current year. The regression results are shown in column (1) of Table 4. Then, Equation (2) was subject to grouping regression of polluting companies and non-polluting companies to examine the different impacts of the CSR of different types of companies on short-term financing. The regression results are shown in column (2) and column (3) in Table 4, respectively.

Table 4. The impact path of short-term financing.

	(1) The Total Sample	(2) Polluting Industries	(3) Non-Polluting Industries
	SDebt	SDebt	SDebt
CSR	0.000170 *** (6.70)	0.000259 *** (4.97)	0.000136 *** (4.60)
Inv	−0.0151 ** (−1.99)	−0.0112 (−0.98)	−0.0142 (−1.45)
Lev	0.00947 *** (4.65)	0.00629 * (1.82)	0.0119 *** (4.44)
Size	−0.0107 *** (−28.78)	−0.0125 *** (−16.94)	−0.0101 *** (−22.45)
Growth	−0.00369 *** (−3.23)	−0.000851 (−0.42)	−0.00435 *** (−3.18)
First	−0.00000373 (−0.18)	−0.0000441 (−1.03)	0.0000116 (0.46)
Dsize	−0.000198 (−1.26)	−0.0000537 (−0.20)	−0.000142 (−0.74)
Dual	−0.000760 (−0.81)	−0.00264 * (−1.80)	0.000788 (0.65)
Rind	0.0309 *** (5.81)	0.0391 *** (3.64)	0.0268 *** (4.20)
Will	−0.000892 (−1.21)	0.00141 (1.33)	−0.00158 * (−1.65)
Seo	−0.00197 ** (−2.54)	−0.00412 *** (−3.23)	−0.000772 (−0.76)
Age	−0.000301 *** (−4.55)	−0.000271 (−1.63)	−0.000296 *** (−3.90)
Tobinq	0.00390 *** (4.97)	0.00198 ** (2.01)	0.00496 *** (4.33)
M1	0.00372 ** (1.98)	0.00533 * (1.79)	0.00359 (1.48)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
_cons	0.248 *** (26.56)	0.292 *** (17.12)	0.233 *** (19.90)
R2	0.481	0.583	0.458
adj. R2	0.470	0.562	0.443
n	4281	1352	2929

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The regression results in column (1) of Table 4 show that CSR and short-term financing were significantly positive at the significant level of 1%. This indicates a positive relation between CSR performance and short-term financing, which is consistent with the theoretical analysis. Moreover, grouping regression results show that the coefficient on $CSR_{i,t-1}$ was both positive and significant (0.000259, $t = 4.97$; 0.000136, $t = 4.30$) when we used $SDebt_{i,t}$ as the dependent variable in the sub-samples of polluting and non-polluting companies. Moreover, the absolute value of the CSR coefficient of polluting companies was larger. This suggests that the debt maturity shorterization of polluting companies is more serious.

4.3.2. The Impact Path of Long-Term Investment

In our theoretical analysis, we argue that the CSR performance will increase the long-term investment of companies. This induces the aggravation of the maturity mismatch of investment and financing. In order to examine the above analysis, Equation (3) was constructed as follows:

$$\text{Inv}_{i,t} = \beta_0 + \beta_1 \text{CSR}_{i,t-1} + \beta_2 \text{SDebt}_{i,t} + \sum \beta_j \text{Controls}_{i,t} + \varepsilon_{i,t} \quad (3)$$

$\text{Inv}_{i,t}$ represents the new investment amount, measured by the cash expenditure of investment activities such as purchase and construction of fixed assets, and standardized by total assets. Equation (3) regresses $\text{Inv}_{i,t}$ with $\text{CSR}_{i,t-1}$ to examine whether CSR performance promotes the investment behavior of companies. At the same time, in order to exclude the influence of corporate financing on investment decisions, short-term financing (SDebt) of the current year was controlled. The regression results are shown in Table 5 (1). A grouping regression of polluting and non-polluting companies was conducted in Equation (3) to examine the different impacts of CSR on long-term investment among companies of different categories. The regression results are shown in columns (2) and (3) of Table 5, respectively.

Table 5. The impact path of long-term investment.

	(1) The Total Sample	(2) Polluting Industries	(3) Non-Polluting Industries
	Inv	Inv	Inv
CSR	−0.000125 (−0.93)	−0.000121 (−0.61)	−0.000128 (−0.71)
SDebt	−0.0673 (−1.40)	−0.160 (−1.49)	−0.0323 (−0.59)
Lev	−0.00142 (−0.14)	−0.0129 (−0.84)	0.0106 (0.87)
Size	0.00885 *** (2.80)	−0.000544 (−0.08)	0.00873 ** (2.40)
Growth	−0.00236 (−1.18)	−0.00200 (−0.57)	−0.00203 (−0.85)
First	−0.000122 (−0.72)	0.000138 (0.50)	−0.000202 (−0.95)
Dsize	0.000268 (0.28)	0.00162 (1.02)	−0.000188 (−0.15)
Dual	0.00466 (1.56)	−0.000341 (−0.07)	0.00767 ** (2.06)
Rind	−0.0180 (−0.79)	0.0332 (0.73)	−0.0358 (−1.39)
Will	−0.00527 ** (−2.06)	−0.00761 * (−1.67)	−0.00236 (−0.90)
Seo	0.00879 (1.35)	0.00638 (0.69)	0.00627 (0.82)
Age	−0.00479 *** (−7.39)	−0.00681 *** (−6.07)	−0.00350 *** (−4.35)
Tobinq	0.000619 (0.63)	0.000444 (0.22)	0.000289 (0.27)
M1	−0.00477 *** (−3.55)	−0.00756 *** (−3.35)	−0.00272 * (−1.66)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
_cons	−0.0786 (−1.18)	0.176 (1.15)	−0.0907 (−1.20)
R2	0.155	0.266	0.112
adj. R2	0.144	0.252	0.098
n	4281	1352	2929

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The regression results in column (1) of Table 5 show that the relation between CSR and Inv is not significant (-0.000125 , $t = -0.93$). This result indicates that CSR may not increase long-term investment. This may be due to the complexity of the types of long-term investment activities. When measuring the amount of new investment, this paper only considered the cash expenditures of investment activities such as the purchase and construction of fixed assets. Our measurement approach may ignore other types of long-term investment. The narrow measurement range of new long-term investment may be the reason why this regression is not significant.

4.3.3. The Impact Path of Environmental Investments by Polluting Companies

Because our measurement of long-term investment may not be accurate enough, we focused on the environmental protection investment that has a greater impact on polluting companies. In the theoretical analysis of Hypothesis 2, we argue that polluting companies are forced to perform their environmental responsibilities under environmental regulation. They have to make more long-term investments in environmental protection, such as equipment purchase, technology research and development, and industrial transformation through mergers and acquisitions. In addition, environmental investment is not only a way to perform CSR, but also a long-term investment. Further, the maturity mismatch of investment and financing for polluting companies could be aggravated by forced investment in environmental protection. In order to examine the impact path of the forced environmental investment, we developed Equation (4):

$$\text{Mis}_{i,t} = \beta_0 + \beta_1 \text{CSR_EnvInv}_{i,t-1} + \sum \beta_j \text{Controls}_{i,t} + \varepsilon_{i,t} \quad (4)$$

$\text{CSR_EnvInv}_{i,t-1}$ measures the environmental protection investment lagged by one stage. The data on the amount of environmental protection investment are also provided by the Rankings CSR Ratings (RKS) database. $\text{CSR_EnvInv}_{i,t-1}$ is calculated by standardizing the ratio of the amount of environmental protection investment to the total assets.

The results of Equation (4) are shown in Table 6, where there is a significant positive association between environmental investment and the maturity mismatch of investment and financing. This result also supports Hypothesis 1, as environmental investment is also a way of performing CSR. Columns (2) and (3) in Table 6, respectively, show the regression results of the polluting company group and the non-polluting company group. It was found that the coefficient on $\text{CSR_EnvInv}_{i,t-1}$ in the polluting company group was positive and significant (0.0168 , $t = 3.96$), while the coefficient on $\text{CSR_EnvInv}_{i,t-1}$ in the non-polluting company group was not significant (0.0188 , $t = 1.33$). The regression results support our conclusion that polluting companies are forced to invest in environmental protection under the pressure of greater environmental regulation, whereas non-polluting companies are able to avoid the long-term capital occupation caused by environmental investment, as environmental regulation has less impact on them.

Table 6. The impact path of environmental investments by polluting companies.

	(1) The Total Sample	(2) Polluting Industries	(3) Non-Polluting Industries
	Mis	Mis	Mis
CSR_EnvInv	0.0178 *** (4.35)	0.0168 *** (3.96)	0.0188 (1.33)
Lev	0.328 (0.52)	1.147 (1.37)	-0.229 (-0.26)
Size	0.0312 (0.15)	-0.101 (-0.33)	-0.0175 (-0.08)

Table 6. Cont.

	(1) The Total Sample	(2) Polluting Industries	(3) Non-Polluting Industries
	Mis	Mis	Mis
Growth	−0.124 (−1.07)	−0.0890 (−0.38)	−0.125 (−0.92)
First	0.0167 ** (2.12)	−0.00811 (−0.70)	0.0225 ** (2.51)
Dsize	0.0177 (0.35)	0.116 (1.32)	−0.0290 (−0.48)
Dual	−0.0654 (−0.42)	−0.487 ** (−2.56)	0.259 (1.26)
Rind	−1.767 (−1.49)	1.125 (0.59)	−2.671 * (−1.83)
Will	0.521 *** (3.04)	0.471 * (1.82)	0.608 *** (2.62)
Seo	−0.667 (−0.79)	−0.506 (−0.30)	−0.738 (−0.78)
Age	0.157 *** (10.23)	−0.410 *** (−4.08)	0.175 *** (9.42)
Tobinq	−0.0367 (−0.45)	−0.142 (−1.44)	−0.00254 (−0.02)
M1	4.788 *** (9.52)	−0.329 *** (−3.15)	5.025 *** (8.17)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
_cons	−3.964 (−0.80)	6.903 (1.01)	−2.158 (−0.38)
R2	0.187	0.154	0.189
adj. R2	0.176	0.139	0.177
n	4281	1352	2929

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.4. Heterogeneity Analysis of Disclosure Intention

At present, there are two forms of CSR disclosure in China, mandatory disclosure and voluntary disclosure. Different disclosure intentions affect the quality of the signals transmitted by CSR performance. Further, the differences in signal quality also affect the relation between CSR performance and the maturity mismatch of investment and financing. Compared with mandatory disclosure, voluntary disclosure is more manipulative. Companies are likely to manipulate the time, method and content of information disclosure to meet their own needs [40]. For example, Chakravarthy et al. (2014) [41] found that companies would try to use CSR activities for reputation risk management when their reputation was damaged due to financial restatement. Hence, they had an incentive to voluntarily disclose CSR reports. In contrast, mandatory disclosure is restricted by compliance. The disclosure time, form and content are more standardized. What is more, the information disclosed is more authentic [42]. Therefore, compared with voluntary disclosure, commercial banks are more willing to lend to companies that choose mandatory disclosure, as it has stronger information advantages. Based on the theoretical analysis in this paper, commercial banks are not highly willing to issue long-term loans. Among companies with the same level of CSR, those that choose mandatory disclose in their social responsibility reports can obtain more short-term loans. This further aggravates their maturity mismatch of investment and financing. In order to examine the moderating effect of disclosure intention, we built Equation (5):

$$\text{Mis}_{i,t} = \beta_0 + \beta_1 \text{CSR}_{i,t-1} + \beta_2 \text{Will}_{i,t-1} + \beta_3 \text{CSR}_{i,t-1} \times \text{Will}_{i,t-1} + \sum \beta_j \text{Controls}_{i,t} + \varepsilon_{i,t} \quad (5)$$

$Will_{i,t-1}$ represents the disclosure intention. When a company voluntarily discloses its CSR, it was assigned 1, otherwise 0. The results of Equation (5) are shown in Table 7. Column (2) of Table 7 shows the regression results of the whole sample. The regression results show that the coefficient on $CSR_{i,t-1} \times Will_{i,t-1}$ is not significant. The regression results of polluting company sub-samples show that the coefficient on $CSR_{i,t-1} \times Will_{i,t-1}$ is negative and significant (-0.0286 , $t = -1.77$), while the coefficient on $CSR_{i,t-1} \times Will_{i,t-1}$ is not significant in the non-polluting company sub-samples (-0.0107 , $t = -0.56$). These indicate that the disclosure intention only has an impact on the polluting companies. Moreover, compared with the polluting companies who voluntarily disclose, the maturity mismatch of investment and financing is more serious when they choose mandatory disclosure. The possible reason for this is that polluting companies have lower profitability and face higher legal risks compared with non-polluting companies. Even if mandatory disclosure delivers higher quality information, banks still tend to issue short-term loans to polluting companies for the purpose of avoiding risks.

Table 7. Heterogeneity analysis of disclosure intention.

	(1) The Total Sample	(2) The Total Sample	(3) Polluting Industries	(4) Non-Polluting Industries
	Mis	Mis	Mis	Mis
CSR	0.0204 *** (2.90)	0.0256 *** (2.99)	0.0342 *** (2.79)	0.0268 ** (2.44)
Will	0.537 *** (0.38)	1.342 ** (2.54)	1.554 ** (0.20)	1.055 (1.68)
CSR×Will		-0.0208 (-1.49)	-0.0286 * (-1.77)	-0.0107 (-0.56)
Lev	0.351 (0.56)	0.336 (0.53)	1.190 (1.42)	-0.229 (-0.26)
Size	-0.0223 (-0.11)	-0.0157 (-0.08)	-0.153 (-0.51)	-0.0696 (-0.30)
Growth	-0.115 (-0.99)	-0.112 (-0.97)	-0.0569 (-0.25)	-0.126 (-0.93)
First	0.0162 ** (2.05)	0.0161 ** (2.04)	-0.00970 (-0.83)	0.0221 ** (2.47)
Dsize	0.0124 (0.25)	0.0132 (0.26)	0.106 (1.22)	-0.0338 (-0.56)
Dual	-0.0512 (-0.33)	-0.0382 (-0.25)	-0.466 ** (-2.45)	0.289 (1.40)
Rind	-1.729 (-1.47)	-1.684 (-1.44)	1.293 (0.68)	-2.675 * (-1.85)
Seo	-0.680 (-0.81)	-0.677 (-0.81)	-0.465 (-0.28)	-0.769 (-0.81)
Age	0.152 *** (10.13)	0.148 *** (9.94)	-0.451 *** (-4.11)	0.169 *** (9.30)
Tobinq	-0.0426 (-0.52)	-0.0342 (-0.42)	-0.124 (-1.27)	-0.00953 (-0.09)
M1	4.974 *** (9.48)	4.966 *** (9.49)	-0.380 *** (-3.41)	5.291 *** (8.20)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
_cons	-3.453 (-0.70)	-3.772 (-0.76)	7.479 (1.11)	-1.967 (-0.35)
R2	0.189	0.190	0.159	0.192
adj. R2	0.178	0.178	0.143	0.179
n	4281	4281	1352	2929

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.5. Heterogeneity Analysis of Corporate Characteristics

Empirical results suggest that companies signal their low credit risk by CSR performance. Since their CSR performance cannot provide proof of their long-term solvency, they are forced to choose more short-term loans in the context of financial repression in China. As a result, the aggravation of the maturity mismatch of investment and financing of companies becomes more serious. If companies can fully demonstrate their long-term solvency, then they will perform CSR and have less maturity mismatch of investment and financing. Studies have shown that the higher the company value and the larger the company size, the stronger the long-term solvency of a company. Therefore, high-value and

large-size companies are more likely to obtain long-term loans from banks [43,44]. If the “Alternative Choice Hypothesis” is true in the Chinese context, only high-value or large-size companies with more CSR can obtain more long-term loans. Thus, they will be less likely to fall into the dilemma of the maturity mismatch of investment and financing. In contrast, low-value or small and medium-sized companies with more CSR may suffer from a heavier maturity mismatch of investment and financing. Therefore, we expect that the impact of CSR on the maturity mismatch of investment and financing to be more apparent in companies with lower value and smaller size. To test our expectation, we grouped the samples based on the level of company value and the size of the company. Then, we estimated Equation (1) with these sub-samples.

4.5.1. Heterogeneity of Company Value

In order to examine the impact of corporate value heterogeneity on the relation between CSR performance and the maturity mismatch between investment and financing, we conducted a grouping regression based on corporate value. If the company’s Tobin’s Q value was greater than, or equal to, the median, this was assigned to high value sub-samples, otherwise to low value sub-samples.

Columns (1) and (2) in Table 8 show the regression results of the high value group and the low value group, respectively. The coefficient on $CSR_{i,t-1}$ is not significant in the high-value group (0.0133, $t = 1.05$), while the coefficient on $CSR_{i,t-1}$ is positive and significant (0.0156, $t = 2.44$) in the low-value group. This suggests that banks are more likely to issue long-term loans to higher-value companies than to lower-value ones. The results are consistent with our expectations.

Table 8. Heterogeneity analysis of company characteristics.

	(1) High-Value	(2) Low-Value	(3) Large-Size	(4) Small-Size
	Mis	Mis	Mis	Mis
CSR	0.0133 (1.05)	0.0156 ** (2.44)	0.00914 * (1.88)	0.0335 ** (2.26)
Lev	0.378 (0.37)	1.057 (1.19)	0.595 (0.98)	−0.759 (−0.81)
Size	−0.239 (−0.78)	−0.265 (−1.39)	−0.146 (−1.09)	−0.377 (−1.12)
Growth	0.0535 (0.30)	−0.114 (−0.79)	−0.0661 (−0.96)	−0.00000903 (−0.00)
First	0.0115 (0.91)	0.0217 ** (2.45)	0.00234 (0.51)	0.0147 (1.22)
Dsize	−0.143 ** (−2.00)	0.0623 (1.19)	0.0444 (1.01)	0.0375 (0.31)
Dual	0.302 (1.02)	−0.153 (−0.96)	−0.104 (−0.86)	0.0680 (0.30)
Rind	−3.920 (−1.59)	−1.070 (−1.09)	0.540 (0.58)	−1.550 (−0.58)
Will	0.120 (0.69)	0.492 *** (2.66)	0.157 (1.46)	0.825 *** (2.61)
Seo	−1.645 (−1.41)	1.977 (1.25)	−0.0941 (−1.07)	−0.565 (−0.58)
Age	0.0116 (0.22)	−0.300 *** (−3.94)	0.0317 (1.16)	−0.798 *** (−8.39)
Tobinq	0.0124 (0.15)	−1.044 ** (−2.33)	0.183 (1.35)	−0.129 (−1.31)
M1	3.931 *** (4.59)	−0.0251 (−0.20)	1.315 ** (2.33)	−0.657 *** (−5.48)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
_cons	7.618 (1.01)	8.961 * (1.93)	1.077 (0.26)	22.22 *** (2.93)
R2	0.275	0.237	0.072	0.291
adj. R2	0.256	0.220	0.053	0.272
n	2140	2141	2141	2140

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.5.2. Heterogeneity of Company Size

In order to examine the impact of corporate size heterogeneity on the relation between CSR performance and the maturity mismatch between investment and financing, we conducted a grouping regression based on corporate size. If the company size was greater than, or equal to, the median, this was assigned to large-size sub-samples, otherwise to small-size sub-samples.

Columns (3) and (4) in Table 8 show the regression results of the large-size group and small-size group, respectively. The coefficient on $CSR_{i,t-1}$ is less significant in the large-size sub-sample than in the small-size sub-samples, and the absolute value of the coefficient is smaller (0.00914, $t = 1.88$, 0.0335, $t = 2.26$). This suggests that banks are more willing to issue long-term loans to larger companies than to smaller ones. This is also consistent with our expectations.

4.6. Robustness Testing

In order to ensure the robustness of the above results, we estimated Equation (1) using OLS (Ordinary Least Squares). We also controlled the fixed effects of industry, year and province, and considered the impact of heteroscedasticity. The regression results are shown in Table 9. The coefficient on $CSR_{i,t-1}$ was still positive and significant when we used $Mis_{i,t}$ as the dependent variable. This indicates a significant positive relation with the maturity mismatch of investment and financing. What is more, the value of the coefficient on the $CSR_{i,t-1}$ of polluting industries sub-samples was less than that of non-polluting industries sub-samples. All these results indicate that our estimations are robust.

We also used long-term financing (LFin) to replace the short-term financing ratio to test the mechanism of the impact of CSR performance on the maturity mismatch of investment and financing. The fixed effect model was used again to estimate Equation (2). Results are shown in Table 10. It was found that the coefficient on $CSR_{i,t-1}$ was negative and significant (-0.0204 , $t = -2.89$) when we used $LFin_{i,t}$ as the dependent variable, and there was no significant difference between polluting companies and non-polluting companies. This once again shows that companies with good CSR performance are more inclined to borrow short-term funds and perform long-term investment activities with short-term funds instead of long-term funds. This also validates the robustness of our regression analyses.

Table 9. Robustness test: regress Equation (1) using OLS (Ordinary Least Squares).

	(1) The Total Sample	(2) Polluting Industries	(3) Non-Polluting Industries
	Mis	Mis	Mis
CSR	0.00512 * (1.75)	0.00972 * (1.68)	0.00658 * (1.71)
Lev	0.0821 (0.32)	-0.0296 (-0.07)	0.177 (0.51)
Size	-0.206 *** (-5.64)	-0.229 *** (-2.95)	-0.217 *** (-4.93)
Growth	-0.134 (-1.30)	-0.126 (-0.64)	-0.164 (-1.37)
First	0.00469 * (1.68)	-0.000204 (-0.04)	0.00610 * (1.78)
Dsize	-0.00411 (-0.22)	-0.00953 (-0.24)	-0.00227 (-0.10)
Dual	0.0865 (0.86)	0.0376 (0.23)	0.105 (0.89)
Rind	0.139 (0.23)	1.774 (1.04)	-0.383 (-0.56)
Will	0.311 *** (3.51)	0.299 * (1.86)	0.326 *** (3.03)
Seo	-0.0192 (-0.21)	-0.0703 (-0.39)	0.00542 (0.05)

Table 9. Cont.

	(1) The Total Sample	(2) Polluting Industries	(3) Non-Polluting Industries
	Mis	Mis	Mis
Age	−0.00144 (−0.17)	0.0323 (1.63)	−0.0112 (−1.19)
Tobinq	−0.0891 ** (−1.98)	−0.178 *** (−3.30)	−0.0436 (−0.65)
M1	3.170 *** (9.15)	3.297 *** (5.10)	3.216 *** (7.71)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Province	Yes	Yes	Yes
_cons	4.649 *** (5.00)	4.068 ** (2.58)	5.059 *** (4.49)
R2	0.153	0.169	0.161
adj. R2	0.134	0.129	0.138
n	4281	1352	2929

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10. Robustness test: An alternate measure of short-term financing.

	(1) The Total Sample	(2) Polluting Industries	(3) Non-Polluting Industries
	LFin	LFin	LFin
CSR	−0.0204 *** (−2.89)	−0.0236 ** (−2.19)	−0.0249 *** (−2.66)
Inv	1.567 (1.19)	1.657 (0.65)	0.868 (0.53)
Lev	0.0187 (0.09)	0.154 (0.51)	0.0833 (0.36)
Size	0.115 (1.00)	0.0694 (0.30)	0.124 (0.92)
Growth	−0.0161 ** (−2.04)	0.00954 (0.82)	−0.0221 ** (−2.48)
First	−0.0126 (−0.25)	−0.113 (−1.28)	0.0357 (0.59)
Dsize	0.0493 (0.32)	0.477 ** (2.51)	−0.281 (−1.38)
Dual	1.734 (1.48)	−1.356 (−0.70)	2.695 * (1.87)
Rind	−0.534 *** (−3.09)	−0.477 * (−1.78)	−0.634 *** (−2.73)
Will	0.672 (0.80)	0.472 (0.28)	0.766 (0.81)
Seo	0.538 *** (8.45)	0.449 *** (3.93)	0.563 *** (7.32)
Age	0.0425 (0.52)	0.144 (1.47)	0.0126 (0.11)
Tobinq	0.524 *** (7.25)	0.358 *** (3.29)	0.583 *** (6.48)
M1	−0.0204 *** (−2.89)	−0.0236 ** (−2.19)	−0.0249 *** (−2.66)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
_cons	−9.900 ** (−2.25)	−7.904 (−1.18)	−12.84 ** (−2.56)
R2	0.188	0.155	0.191
adj. R2	0.177	0.139	0.178
n	4281	1352	2929

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5. Conclusions

This paper takes the Shanghai and Shenzhen A-share listed companies from 2009 to 2018 as a sample to study the impact of CSR performance on the maturity mismatch of investment and financing of companies, as well as the heterogeneity between polluting companies and non-polluting companies. We reached the following conclusions:

- (1) CSR performance can aggravate the maturity mismatch of investment and financing, and this effect is more serious in polluting companies.
- (2) In the mechanism tests, we found that CSR makes companies obtain more short-term debt. Moreover, polluting companies perform more environmental responsibilities in the form of long-term investments than non-polluting companies. These phenomena aggravate the maturity mismatch of investment and financing.
- (3) We further investigated the impact of disclosure intention on this relation, and found that the disclosure of CSR reports by polluting companies could aggravate the negative impact of CSR performance on the maturity mismatch of investment and financing.
- (4) The influence of the heterogeneity of company characteristics was also investigated, and we found that the impact of CSR on the maturity mismatch of investment and financing is more apparent in the companies with lower value and smaller size.

Based on the above conclusions, we put forward the following suggestions:

- (1) In daily business activities, companies should always pay close attention to the maturity mismatch level of investment and financing, and accurately assess their own long-term investment capacity. As CSR performance only brings more short-term funding, they should not blindly expand the scale of their long-term investment.
- (2) Polluting companies should adopt an operation mode with low energy consumption and low pollution as soon as possible. This helps polluting companies alleviate the financing constraints and avoid rigid environmental regulation [45]. As such, they can achieve the goal of maintaining a balanced development of economy and ecology while not falling into the dilemma of the maturity mismatch of investment and financing.
- (3) Polluting companies should take full advantage of the information transmission function of non-financial information and strengthen their willingness to disclose CSR information [46].
- (4) Companies should continuously improve their core competences and increase corporate value in order to enhance their long-term solvency. It is these core competences that can improve banks' willingness to issue long-term loans. Further, companies are capable of creating space for the reasonable arrangement of investment and financing activities.

At the same time, our research conclusions have the following implications for investors and policy makers:

- (1) Investors can judge the degree maturity mismatch of investment and financing according to the characteristics of a company and its CSR performance. If a company with a higher CSR is a polluting company or a small and medium-sized company, then its investment and financing mismatch may be serious. This indicates a greater financial risk. Investors should be cautious about investing in this company.
- (2) Policy makers should constantly promote the construction of the financial supervision system and improve the credit investigation system. This makes the information between financing companies and investors more transparent and fundamentally solves the problem of weak long-term fund supply willingness [47].
- (3) Policy makers should promote the construction of a multi-level and multi-channel financing system. This could provide more financing channels and create a better financing environment for companies.

- (4) Policy makers should ensure a reasonable credit spread between long-term funds and short-term funds to improve the willingness of long-term funds supply.
- (5) Policy makers should try to ensure the stability of monetary policy. In such a policy environment, banks can establish a reasonable expectation, which in turn increases their willingness to provide long-term funding.

Finally, it should be pointed out that this study could be improved, in the future, with regard to the following limitations:

- (1) The findings of this study are limited to the Chinese context, which may lead to different conclusions in different countries and regions.
- (2) Limited by the data, this paper is unable to classify the different dimensions of social responsibility score and further study the impact of different types of social responsibility on the maturity mismatch of investment and financing.

Author Contributions: Conceptualization, S.L. and X.B.; methodology and formal analysis, Q.L.; writing—original draft preparation, S.L., X.B. and Q.L.; writing—review and editing, M.J.C.C. and X.Y.; supervision, S.L. and X.Y.; funding acquisition, S.L. All authors have read and agreed to the published version of the manuscript.

Funding: The paper was supported by the following fund project: General project of philosophy and social science research of the Ministry of Education (project no. 18JHQ083).

Conflicts of Interest: The authors declare no conflicts of interest.

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