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26 January 2022

Online at https://mpra.ub.uni-muenchen.de/111682/ MPRA Paper No. 111682, posted 27 Jan 2022 02:57 UTC

Corporate environmental responsibility, financial performance, and international bank loans: Evidence from China

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January 2022

Abstract

In the context of sustainable development and "going global" strategies, Chinese firms are paying more attention to corporate environmental responsibility (CER). Using a sample of Chinese firms from 2010-2019, this study examines the impact of CER on corporate financial performance (CFP) and international bank loans. We find that the proactive disclosure of non-hazardous industrial waste (NHIW) emissions has no significant effect on the return on assets (ROA) but significantly increases the return on equity (ROE). In addition, our results show that international banks will offer lower loan spreads and longer loan maturities to firms with better environmental performance.

JEL classification: G32, G33, G34

Keywords: Non-hazardous industrial waste, corporate environmental responsibility, financial performance, international bank loans

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1. Introduction

Over the past decade, corporate social responsibility (CSR) has become an important research domain (Deng et al., 2013; Dyck et al., 2019; Chen et al., 2020; Dai et al., 2021). Corporate environmental responsibility (CER) is the environmental dimension and a crucial component of CSR (Jamali, 2008). As major pollution makers and environmental destroyers, enterprises are expected to behave responsibly towards the environment. Meanwhile, many recent studies are devoted to exploring the determinants and financial implications of CER (Manrique and Martí-Ballester, 2017; El Ghoul et al., 2018; Chen et al., 2021; Choi et al., 2021; Xu et al., 2021).

With the rapid economic development and the ecological degradation of emerging economies, environmental protection and sustainable development are receiving more and more attention (Xu et al., 2016). China is the fastest-growing developing country and has become the world's second-largest economy since 2010. However, the rapid growth is at the cost of ecological imbalance, and China is experiencing serious industrial pollution (Li et al., 2016). Despite the increasing importance of CER in emerging economies, research regarding this topic is still limited.

In recent years, the Chinese government attaches great value to environmental protection and has enacted a series of laws and regulations concerning CER. As a result, several studies explore the effects of environmental regulations on CER in China (Li et al., 2017; Wong et al., 2018; Chen, Li, Chen, and Huang, 2021; Zhang et al., 2021). Instead of government environmental regulations (i.e., reactive CER), the present paper focuses on the effects of proactive CER. Using a sample of Chinese firms from 2010-2019, we empirically explore how the proactive disclosure of non-hazardous industrial waste (NHIW) emissions affects corporate financial performance (CFP) and international borrowing costs.

Our study contributes to three branches of the literature on CER. First, we explore the relationship between proactive CER and CFP in China (an emerging economy). There is an ongoing debate in the previous studies on the impact of CER on CFP. Some studies suggest that CER can positively affect CFP by improving information transparency, operational efficiency, and corporate reputation (Wei et al., 2017; Jia and Li, 2020; Pham et al., 2020). In contrast, Horváthová (2010) and Lioui and Sharma (2012) find that CER investment leads to poorer financial performance. Kim and Statman (2012) argue that firms should adjust the amount of CER investment to maximize CFP. Furthermore, a recent study by Biktimirov and Afego (2021) provides a comparison of the impact of CER on CFP between developed and emerging economies. In this paper, we do not find a significant relationship between the disclosure of NHIW emissions

and the return of asset (ROA); see Horváthová (2012), who also provides evidence that CER has no impact on ROA. However, our empirical results show that proactive disclosure of NHIW emissions will significantly improve an enterprise's return on equity (ROE), earnings per share (EPS), and net assets per share (NAVPS).

Second, the present paper adds to the literature on environmental, social, and governance (ESG); see Gillan et al. (2021), Pedersen et al. (2021), and Yoo and Managi (2021) for recent studies. With the implementation of a sustainable development strategy, the Chinese government and companies are paying more and more attention to ESG ratings. In this paper, we consider three different ESG evaluation systems: China Alliance of Social Value Investment ESG rating, SynTao Gree Finance ESG rating, and FTSE Russell ESG rating. Our results show that proactive disclosure of NHIW emissions significantly raises all these three ESG rating scores.

Finally, we focus on the impact of proactive CER on bank loans in China. Many prior studies document that fulfillment of CER lowers the cost of bank loans (Goss and Roberts, 2011; Nandy and Lodh, 2012; Hoepner et al., 2016; Banerjee et al., 2020; Chen et al., 2021). In the context of economic globalization, many Chinese enterprises are implementing the "going global" strategy. Consequently, it is becoming increasingly important to make full use of international financial markets to optimize the allocation of resources. To the best of our knowledge, there is little evidence of how CER influences international bank loans in emerging markets. A novel contribution of our study is to fill this gap. Using 232 international bank loan contracts from 92 Chinese firms, we find that international banks offer lower loan spreads and longer loan maturities to Chinese firms that disclose more NHIW emissions.

The remainder of this paper is organized as follows. Section 2 describes the data and method. Section 3 presents the empirical results. Section 4 concludes all of this paper.

2. Data and model specification

Our sample contains three sets of data. We obtain firm data from the CSMAR database, which includes firm performance, rating records, and firm characteristics. The amount of non-hazardous waste and the ESG rating levels are collected from the WIND database. Our sample period ranges from 2010 to 2019 and includes 3,381 Chinese enterprises. In addition, we collect details of international bank loan contracts from the DealScan database, which includes the transaction records of the loan spread, security status, loan maturity, and loan amount. Our final sample of

international bank loans of Chinese companies includes 232 firm-year bank loan contracts from 92 individual firms. The definitions and sources of all variables are presented in Table 1.

[Insert Tables 1 and 2]

Table 2 presents the summary statistics for all variables. In panel A, the mean values of *ROEA, EPS, NAVPS,* and *NHIW* are 0.0332, 0.3803, 6.2168, and 0.0694, respectively. The characteristics of international bank loans are reported in Panel B. The mean of *Spread, Maturity, and NHIW* are 234.3932 bps (natural logarithm of 5.4570), 3.6633, and 0.1948, respectively.

Specifically, we examine the impact of the disclosure of NHIW emissions on firm performance and ESG ratings by the following regression setting:

Firm Performance $(ESG \ rating)_{i,t} = \alpha_1 + \alpha_2 NHIW_{i,t-1} + \beta' Firm_{i,t-1} + v_{i,t} + \omega_t + \varepsilon_{i,t}$. (1) where dependent variables Firm Performance_{i,t} and ESG rating_{i,t} are firm *i*'s financial performance and ESG rating levels in year *t*, respectively. Firm_{i,t-1} is the vector of the firm characteristics for firm *i* in year t-1. $v_{i,t}$ and ω_t are the industry and year fixed effects, respectively. The term $\varepsilon_{i,t}$ represents the random error. Similarly, we examine the impact of the disclosure of NHIW emissions on bank loan spread and maturity by

 $Spread \left(Maturity\right)_{i,t} = \alpha_1 + \alpha_2 NHIW_{i,t-1} + \beta' Firm_{i,t-1} + \theta' Z_{i,t} + v_{i,t} + \omega_t + \varepsilon_{i,t}, \qquad (2)$ where the term $Z_{i,t}$ is the vector of the loan characteristics for firm *i* in year *t*.

3. Empirical Results

Table 3 presents the effects of *NHIW* on firm performance. In the first and second specifications, the coefficients for *NHIW* are 0.0024 and 0.0029, respectively, but neither reaches a significant level. However, in column (3), we find that *NHIW* is positively associated with the return of average equity (*ROEA*), which is significant at the 10% level. Moreover, columns (4) and (5) show that *NHIW* significantly and positively correlates with both *EPS* and *NAVPS*. Specifically, the coefficients for *NHIW* are 2.74% and 19.63%, respectively, both significant at the 1% level. In summary, although we do not find a significant relationship between the disclosure of NHIW emissions and ROA, the disclosure of NHIW emissions significantly increases ROE, EPS, and NAVPS. In other words, investors consider CER in their investment decisions.

[Insert Table 3]

Next, we examine whether *NHIW* affects ESG ratings, and the results are presented in Table 4. In columns (1), (2), and (3), the coefficients for *NHIW* on ESG ratings are 50.48%, 13.45%, and 4.67%, respectively, all significant at the 1% level. Thus, our results indicate that the proactive

disclosure of NHIW emissions significantly improves firms' ESG rating levels. In addition to ESG ratings, we consider the long-term credit ratings. However, we do not find a significant relationship between *NHIW* and firms' long-term ratings, as shown in columns (4) and (5) of Table 4.

[Insert Table 4]

Table 5 presents the regression results for the effect of *NHIW* on bank loan spreads and loan maturities. In the first specification, the coefficient for *NHIW* on loan spread is negative and significant at the 5% level. This result suggests that firms proactively disclose more NHIW emissions can receive lower loan spreads from international banks. Moreover, in the third specification, the coefficient for *NHIW* on loan maturity is positive and significant at the 5% level. As a result, firms that disclose more NHIW emissions obtain international bank loans with longer maturities. Specifically, in specification (2), the coefficient for *NHIW* remains negative and significant at the 5% level; in specification (4), the coefficient for *NHIW* remains positive and significant at the 10% level. Therefore, our empirical results show that international banks generally offer significantly lower loan spreads and longer loan maturities to Chinese firms that disclose more NHIW emissions.

[Insert Table 5]

Table 6 presents the effects of the difference between non-hazardous and hazardous industrial waste (i.e., relative NHIW, *RNHIW*) emissions on firm performance, ESG ratings, and international bank loans. We find that although the effect of *RNHIW* on *ROEA* becomes insignificant, the coefficients for *RNHIW* on *EPS* and *NAVPS* remain positive and significant at the 5% and 1% levels, respectively. Furthermore, in columns (4) of Panel A at Table 6, we find a significant positive relation between *RNHIW* and ESG ratings at the 1% level. In columns (3) and (4) of Panel B, the coefficients for *RNHIW* on *Spread* and *Maturity* are respectively -17.17% and 10.45%, and both are significant. In summary, our findings are robust when we consider relative NHIW emissions rather than absolute NHIW emissions.

[Insert Table 6]

4. Conclusion

A growing number of studies investigate the relationship between CER and CFP. However, most of the reported findings focus on developed countries. In the context of China's rapid economic growth and ecological degradation, this paper explores how CER affects CFP in China. More importantly, we highlight the effect of proactive disclosure of environmental performance (i.e., proactive CER). Using a sample of Chinese firms from 2010-2019, we find that the disclosure of NHIW emissions has no significant effect on ROA but significantly increases ROE.

With the proposal and implementation of the "going global" strategy, international bank loans are becoming increasingly important for Chinese firms. This paper provides timely evidence on the interesting issue of how CER affects international bank loans in China. Our results show that international banks will offer lower loan spreads and longer loan maturities to firms with better environmental performance. In other words, eco-friendly firms receive more favorable loans from international banks than those with poor environmental performance.

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Table 1 Variable definition	Table	1 V	ariable	definition
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Variable	Definition	Data Source
ROTA	Return of total asset	CSMAR
ROAA	Return of average asset	CSMAR
ROEA	Return of average equity	CSMAR
EPS	Net Income-Preferred dividends / common shares outstanding (T60200)	CSMAR
NAVPS	NAV / shares outstanding (T60300)	CSMAR
RATING21	Firms' rating for 21 different groups	CSMAR
RATING03	Firms' rating for 3 different groups	CSMAR
ESGRATING1	China Alliance of Social Value Investment ESG rating score, otherwise equal to 0.	WIND
ESGRATING2	SynTao Gree Finance ESG rating score, otherwise equal to 0.	WIND
ESGRATING3	FTSE Russell ESG rating score, otherwise equal to 0.	WIND
NHIW	Natural logarithm of amounts of non-hazardous waste, otherwise equal to zero.	WIND
RNHIW	Natural logarithm of amounts of non-hazardous waste minus amounts of hazardous waste, otherwise equal to zero.	WIND
Assets	Natural logarithm of total assets of the firm	CSMAR
MB	Total assets-book value of equity+price*common shares outstanding)/ total assets	CSMAR
Tangibility	Net property, plant, and equipment divided by total assets	CSMAR
Profitability	EBITDA divided by total assets	CSMAR
Leverage	Long-term debt plus debt in current liabilities divided by total assets	CSMAR
CF_Ratio	Cash flow ratio	CSMAR
Spread	Natural logarithm of all-in spread drawn plus one. All-in spread drawn is the amount the borrower pays in basis points over LIBOR or LIBOR equivalent for each dollar drawn down.	DealScan
Secured	A dummy variable that equal to 1 if a loan is secured, and otherwise is 0	DealScan
Maturity	Natural logarithm of loan maturity in months	DealScan
Loan Size	Natural logarithm of the amount of loan in US\$ million	DealScan
Performance	A dummy variable that equals to 1 if the loan facility uses performance pricing, and otherwise is 0	DealScan
Totalcov	Natural logarithm of the number of general plus financial covenants	DealScan

Table 2 Summary Statistics

Panel A reports the summary statistics for all variables. The sample consists of firm-year observations in the Chin from 2010-2019. Panel B presents international bank loan contracts from Dealscan including 232 observations. All variables are defined in Appendix A.

Panel A		0.15	25.0		75.0
Variable	Mean	Std Dev	25 Centile	50 Centile	75 Centile
ROTA	0.5502	116.4695	0.0266	0.0515	0.0826
ROAA	0.4909	108.6246	0.0120	0.0351	0.0645
ROEA	0.0332	4.2442	0.0282	0.0690	0.1136
EPS	0.3803	7.2200	0.0754	0.2556	0.5427
NAVPS	6.2168	360.4988	2.4476	3.7690	5.7081
ESGRATING1	0.3107	1.6004	0.0000	0.0000	0.0000
ESGRATING2	0.0963	0.4087	0.0000	0.0000	0.0000
ESGRATING3	0.0277	0.2029	0.0000	0.0000	0.0000
NHIW	0.0694	0.8736	0.0000	0.0000	0.0000
RNHIW	0.3736	24.0328	0.0000	0.0000	0.0000
Assets	21.8867	1.4986	20.8982	21.6788	22.6159
MB	0.5268	4.4884	0.2868	0.4492	0.6138
Tangibility	0.9358	0.0892	0.9258	0.9641	0.9859
Profitability	0.0490	5.3037	0.0476	0.0774	0.1159
Leverage	0.5115	4.1627	0.2928	0.4510	0.6049
CF_Ratio	0.1695	0.3944	0.0695	0.1259	0.2199
Panel B					
Variable	Mean	Std Dev	25 Centile	50 Centile	75 Centile
Spread	5.4570	0.4852	5.1358	5.5215	5.7991
NHIW	0.1948	1.4774	0.0000	0.0000	0.0000
RNHIW	0.0146	0.1108	0.0000	0.0000	0.0000
Assets	17.2716	1.5224	16.2521	17.1685	18.5186
MB	1.3577	1.3007	0.8400	0.9887	1.3720
Tangibility	0.2125	0.2276	0.0517	0.1871	0.3345
Profitability	0.0853	0.0604	0.0520	0.0803	0.1162
Leverage	0.1242	0.1071	0.0429	0.0937	0.1845
CF_Ratio	0.0959	0.3942	-0.0371	0.0928	0.0249
Secured	0.0894	0.2856	0.0000	0.0000	0.0000
Maturity	3.6633	0.4291	3.5835	3.5835	3.8712
Loan Size	19.5314	1.0538	18.8262	19.5358	20.2739
Performance	0.0093	0.0961	0.0000	0.0000	0.0000
Totalcov	0.3296	1.0227	0.0000	0.0000	0.0000

Table 3 CER effects on firm performance

This table presents regression results for the effects of the disclosure of NHIW emissions on firm performance. The *t*-statistics based on standard errors adjusted for heteroskedasticity are also presented in parentheses. Superscripts *, **, and *** denote the significance of the *t*-test at 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	ROTA	ROAA	ROEA	EPS	NAVPS
NHIW	0.0024	0.0029	0.0752*	0.0274***	0.1963***
	(0.65)	(0.76)	(1.79)	(3.54)	(3.73)
Assets	0.0072	0.0070	-0.4322*	0.1383***	1.1126***
	(0.83)	(0.79)	(-1.79)	(18.34)	(38.98)
MB	0.7714*	0.7794*	-3.8266	0.6120***	1.1729***
	(1.88)	(1.89)	(-0.98)	(3.44)	(2.81)
Tangibility	0.0163	0.0232	-1.0831	0.4727***	0.2451
	(0.40)	(0.56)	(-1.00)	(6.11)	(0.89)
Profitability	0.5455*	0.5506**	-2.2066	0.4062***	0.7607***
	(1.95)	(1.96)	(-0.90)	(3.42)	(2.69)
Leverage	-0.5963	-0.6202	13.9192*	-0.5504***	-1.9540***
	(-1.28)	(-1.32)	(1.71)	(-2.87)	(-4.01)
CF_Ratio	0.2055**	0.2248**	5.8868**	1.0741***	4.3764***
	(2.01)	(2.17)	(2.05)	(14.59)	(16.50)
Constant	-0.2978**	-0.3093**	5.0395	-3.5242***	-22.1077***
	(-2.08)	(-2.15)	(1.45)	(-18.59)	(-32.05)
<u>Control for</u>					
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.0800	0.0805	0.3158	0.0985	0.2084
Obs.	23,008	23,008	22,845	23,008	23,008

Table 4 CER effects on ESG ratings

This table presents regression results for the effects of the disclosure of NHIW emissions on ESG ratings. The *t*-statistics based on standard errors adjusted for heteroskedasticity are also presented in parentheses. Superscripts *, **, and *** denote the significance of the *t*-test at 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	ESGRATING1	ESGRATING2	ESGRATING3	RATING21	RATING03
NHIW	0.5048***	0.1345***	0.0467***	-0.0085	-0.0009
	(12.51)	(12.61)	(5.82)	(-0.86)	(-1.40)
Assets	0.4593***	0.1027***	0.0275***	-0.9846***	-0.0071***
	(28.96)	(32.03)	(18.54)	(-43.54)	(-3.08)
MB	0.1423	0.0609***	0.0260***	2.0814***	0.1392***
	(1.61)	(3.11)	(3.17)	(4.69)	(3.15)
Tangibility	0.3916***	0.0978***	0.0086	-0.9007***	-0.0139
	(4.07)	(3.82)	(0.67)	(-5.06)	(-0.89)
Profitability	0.0559	0.0313**	0.0151***	-6.0447***	-0.5991***
	(0.93)	(2.34)	(2.72)	(-7.67)	(-5.49)
Leverage	-0.1312	-0.0593***	-0.0275***	0.9434***	-0.0243
	(-1.38)	(-2.75)	(-3.08)	(2.71)	(-0.82)
CF_Ratio	0.8154***	0.2077***	0.0531***	-0.8334***	-0.0638**
	(11.46)	(11.49)	(6.87)	(-3.11)	(-2.41)
Constant	-10.4689***	-2.3035***	-0.6135***	26.5416***	1.1944***
	(-27.99)	(-28.31)	(-16.85)	(53.99)	(24.84)
<u>Control for</u>					
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.2546	0.2700	0.2289	0.5386	0.1510
Obs.	23007	23007	23007	4384	4384

Table 5 CER effects on international bank loans

This table presents regression results for the effects of the disclosure of NHIW emissions on international bank loans. The *t*-statistics based on standard errors adjusted for heteroskedasticity are also presented in parentheses. Superscripts *, **, and *** denote the significance of the *t*-test at 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(4)	(5)
	Spread	Spread	Maturity	Maturity
NHIW	-0.0275**	-0.0127**	0.0289**	0.0076*
	(-2.15)	(-2.37)	(2.23)	(1.74)
Assets	-0.0209	-0.1729***	-0.0684**	-0.0468
	(-0.44)	(-3.10)	(-2.48)	(-0.74)
MB	-0.0204	0.0132	-0.0018	-0.0319
	(-0.66)	(0.50)	(-0.12)	(-0.68)
Tangibility	0.2541	-0.5237	-0.4187**	0.1623
· ·	(1.26)	(-0.92)	(-2.10)	(0.29)
Profitability	0.2760	0.5272	0.1643	-0.1526
	(0.56)	(1.18)	(0.32)	(-0.31)
Leverage	0.6181	0.9448***	-0.9551***	-0.3715
-	(1.26)	(3.62)	(-2.84)	(-1.15)
CF_Ratio	-0.1427	0.1527	0.0379	0.0514
	(-1.13)	(0.80)	(0.21)	(0.23)
Secured	0.1601	0.0215	0.0865	0.1200
	(1.18)	(0.34)	(0.69)	(1.11)
Spread			0.0472	0.1050
-			(0.55)	(0.47)
Maturity	0.0467	0.0581		
	(0.56)	(0.54)		
Loan Size	-0.1572**	0.0241	0.2118***	0.1341
	(-2.54)	(0.39)	(4.85)	(1.56)
Performance	0.2955**	0.3726***	-0.3188***	-0.0725
	(2.53)	(5.31)	(-2.81)	(-0.74)
Totalcov	-0.0414	0.0457**	0.0117	-0.0600**
	(-0.80)	(2.16)	(0.48)	(-2.03)
Constant	8.5844***	6.2814***	0.6212	-1.5891
	(10.69)	(6.25)	(0.68)	(-0.99)
<u>Control for</u>				
Firm FE	No	Yes	No	Yes
Industry FE	No	Yes	No	Yes
Loan Purpose	No	Yes	No	Yes
Loan Type	No	Yes	No	Yes
Obs.	232	232	232	232
Adj. R^2	0.2114	0.8986	0.2388	0.8251

Table 6 Robustness: Difference between non-hazardous and hazardous industrial waste

This table presents the regression results of our robustness checks. The *t*-statistics based on standard errors adjusted for heteroskedasticity are also presented in parentheses. Superscripts *, **, and *** denote the significance of the *t*-test at 10%, 5%, and 1% levels, respectively.

Panel A				
	(1)	(2)	(3)	(4)
	ROEA	EPS	NAVPS	ESGRATING1
RNHIW	0.0011	0.0010**	0.0092***	0.0086***
	(1.76)	(3.03)	(4.51)	(6.10)
Constant	4.9302***	-3.5557***	-22.3085***	-11.1739**
	(3.38)	(-9.45)	(-12.51)	(-2.47)
<u>Control for</u>				
All	Yes	Yes	Yes	Yes
$Adj. R^2$	0.3157	0.0985	0.2092	0.2158
Obs.	22,845	23,008	23,008	23,007
Panel B	(1)	(2)	(3)	(4)
	Spread	Maturity	Spread	Maturity
RNHIW	-0.2196***	-0.1290**	-0.1717**	0.1045*
	(-3.03)	(-2.42)	(-2.26)	(1.74)
Constant	5.4041***	3.6934***	6.2766***	-1.5872
	(87.45)	(81.47)	(6.24)	(-0.99)
<u>Control for</u>				
All	No	No	Yes	Yes
Adj. R^2	-0.0018	-0.0035	0.8986	0.8251
Obs.	233	233	232	232