CEO's Air Pollution Exposure and Bank Lending Decisions

Xiaomeng Shi

Mingzhu Wang*

This version: 15 January 2022

Abstract

We investigate in this paper the effect of bank CEOs' pollution experience during impressionable years on bank lending to borrowers of different environmental profiles. Using a sample of commercial bank loans in the U.S. over the period 1992-2018, we find that while banks on average charge borrowers with a higher level of chemical emissions higher interest rates, this effect is weakened when the bank CEOs have greater exposure to air pollution during their young adulthood. Banks with such CEOs also allocate more credit to non-green industries. The moderating effect of bank CEOs' air pollution exposure on loan price charged for borrowers with different levels of emission is weakened with the rise of new government regulations, plans, and public concern for environmental issues and climate change.

Keywords: CEO Pollution Exposure, Commercial Loans, Chemical Emissions

JEL Classifications: G21, G30

*Corresponding author: Dr. Mingzhu Wang, Bush House, 30 Aldwych, King's College London, London WC2B 4BG, Email: mingzhu.wang@kcl.ac.uk.

1. Introduction

With the rising concern on environmental issues and climate changes in the recent decade, academic research focus on firms' environmental behaviours that affect their access to bank loans. Banks value borrowers' environmental performance in chemical release or greenhouse gas emissions (Chen et al. 2021; Degryse et al. 2020; Reghezza and Altunbas, 2022), charge borrowers with more carbon emissions relative higher rates (Degryse et al. 2020) and reallocate credit away from firms with more greenhouse gas emissions (Reghezza and Altunbas, 2022).[1] Such credit cost would reshape the borrower's environmental performance consequently that borrowers may receive the signal and improve their environmental performance (Choy et al. 2021). As such, borrowers that face more climate change risk or fail to perform well in environmental protection seem to have more obstacles to getting credit from banks. Meanwhile, a stand of prior research shows that CEO's personal traits and personal experience affect the firm's environmental performance practices (Lewis et al. 2014; Arena et al. 2018). Chen et al. (2021) find that banks directed by CEOs parenting a first-born daughter are greener and offer loan discount to borrowers with better CSR performance.[2] Yet extent literature pays little attention to CEOs' personal experiences with exposure to pollution. Our paper fills this void by examining whether bank CEOs' air pollution exposure affects the banks' lending decisions to borrowers with different levels of emission. We attempt to understand the influence of the CEO's pollution experience on the evaluation of the borrower's greenness in terms of the final loan price and credit allocation.

[1] The U.S. court ruled that carbon dioxide is a source of air pollution and the emission should be regulated by the EPA in 2007 ("SUPREME COURT OF THE UNITED STATES" 2007). Hence, the majority of greenhouse gas are air pollutants.

[2] Most prior studies explore the influence of CEOs' personal trait and experience on environmental activities or performance firms in non-financial industries. For example, the CEOs' political ideologies impact firms' corporate social responsibility (CSR) practices as firms led by liberal CEOs exhibit greater advances in CSR (Chin et al. 2013). Companies with newly appointed CEOs and CEOs with an MBA degree are more likely to respond to the Carbon Disclosure Project compared to those led by lawyers（Lewis et al. 2014). Hubristic CEOs promote the firm's environmental innovations (Arena et al. 2018). Additionally, the CEO's foreign experience is associated with better corporate green innovations (Quan et al. 2021).

We focus on CEOs' air pollution exposure as air pollutants could be recognised quickly by humans, there is little way for people to avoid or to self-protect from such pollution and hence people commonly have very intuitional feelings about air pollution. We are interested in CEOs' exposure to air pollution during early adulthood because the *Impressionable Years Hypothesis* implies that core beliefs and values are crystallized in the early adulthood of age 18-25 (Krosnick and Alwin 1989). The susceptibility to attitude change is high during such early adulthood while dropping sharply afterward (e.g., Sears 1983; Krosnick and Alwin 1989). The individual social experience during early adulthood has a profound impact on an individual's values, attitudes, and views of the world (Ryder 1965; Carlsson and Karlsson 1970; Sears 1975). Empirical analyses from literature in multiple disciplines (e.g., Murphy et al. 1969; Krosnick et al. 1989; Giuliano and Spilimbergo 2014) provide concrete evidence on the impact of early adulthood experience on the personal decisions and values in the remainder of the life span. According to the *Impressionable Years Hypothesis*, we conjecture that the CEOs' pollution exposure during their undergraduate studies could have significant impacts on their decision making that shapes the lending decisions of their managed banks.

We collect the historical air pollution data for the locations where bank CEO did their undergraduate studies to construct the CEOs' pollution exposure experience index. We hand-collect the university location of bank CEOs' undergraduate study at the county level and linked it to the county-level air pollution index - total suspended particles (TSP). We take the arithmetic average mean value of TSP covering the time interval for the CEO's undergraduate study as the definitive proxy for the air pollution experience. Emissions of borrowing firms, and commercial loan contract data are collected from the DealScan for the sample period of 1992-2018.[3]

[3] Our sample period starts in 1992, the earliest year when the bank CEO information is available from Execucomp database and ends in 2018 as we start the research project.

Our baseline regression empirically explores the influence of the bank CEO's air pollution exposure during the impressionable years on loan prices. According to our empirical evidence, firms with higher emissions would pay higher prices for borrowing money from banks, which is consistent with Degryse et al. (2020). But the positive relationship between the borrower's emission level and loan price is moderated by the CEO's air pollution exposure experience. Borrowers with similar level of emission on average obtain a discount of 29 basis points on the loan spread if the CEOs' pollution experience index increases by one standard deviation. Our finding is robust after controlling for loan type, loan purpose, borrower industry, borrower state, borrower credit rating, year fixed effects and lender fixed effects. The robustness of our finding is validated by a battery of further tests adopting alternative measures of CEO air pollution exposure and borrower chemical emission, or further controlling for CEO characteristics, bank governance, and bank local geography characteristics.

To establish causality, we use the event of Environmental Protection Agency (EPA) Climate Change Initiative in 2014 coincided with the release of the 3rd National Climate Assessment as the exogenous source of variation. According to Engle et al. (2020), Wall Street Journal Climate Change News Index comes to a peak in 2014 over the most recent decade. Thus, by splitting samples into before and after the year, we find the moderating effect of the CEO's pollution exposure on polluted borrower's loan price diminished after 2014. The EPA's start-up of Climate Change plans and the coincidence of the 3rd National Climate Assessment stoke up the public's concerns about the environment. CEOs exposed more to air pollution during their impressionable years reduce offering lower loan prices to borrowers with higher emissions after 2014.

We perform a series of further tests to explore if the bank CEO's air pollution exposure during the impressionable years influences non-price terms of loan contracts and the bank's performance. We find that banks with more pollution exposure CEOs impose security

requirements on loans to borrowers with higher emissions while tending to grant them short-maturity debts. We then examine the effect of the CEO's pollution exposure on the total lending volume to the industry to investigate the effect of the CEO's air pollution experience on the bank's decision to capital reallocation between green and non-green industries.[4] Following Giannetti and Saidi (2019), we define the *fraction of lending volume* as the proportion of commercial loans issued to the particular industry by each lead arranger every year over the total loans at the same level. On average, banks with CEOs exposed more to air pollution during impressionable years provide more liquidity to non-green industries defined as those covered by the EPA Toxic Release Inventory (TRI) program mandatory list.[5] Lastly, we explore the impact of CEO air pollution exposure on the bank's risk-takings and profitability. The CEO's air pollution exposure is negatively correlated with the bank's strength of the risk management, while the positive effect on the loan profitability is marginal.

Our empirical exploration of CEO air pollution exposure during impressionable years in the context of bank lending activities contributes to the extant literature in several ways. Primarily, our paper extends existent literature examining how a CEO's personal experience / traits influence the bank's performance and decisions. Prior studies show that bank CEOs' overconfidence weakens lending standards and increase leverage during crisis years(Ho et al. 2016), materialism lowers the strength of bank risk management (Bushman et al. 2018), and cultural heritage of immigration generates higher profitability (Nguyen et al. 2018). We contribute to this emerging literature by providing novel evidence linking CEO air pollution exposure during early adulthood to bank lending activities. We show how the CEO's exposure to air pollution intervenes the commercial loans to borrowers in the US commercial loan market

[4] We define industries under the TRI program active supervision as non-green industries. Such industries have at least one category of chemical emission that are included in the TRI program list.
[5] Detail for the TRI program is accessible at https://www.epa.gov/toxics-release-inventory-tri-program.

by investigating: (1) the price of loan contracts borrowers with various environmental profile; and (2) credit allocation between green and non-green industries.

Furthermore, we add to the growing literature on the borrower's environmental performance and the cost of borrowing. Prior literature shows the stylized fact that banks do value borrower's environmental profile in terms of loan spread or credit allocation, e.g., the climate policy exposure (Ramelli et al. 2021) and greenhouse gas emissions (Reghezza and Altunbas 2022). Publicly listed firms voluntarily disclosing carbon emission reports enjoy a lower rate of debt (Kleimeier and Viehs 2016). In addition to general qualifications that determine the price of a loan contract, we extend the range of factors by finding evidence that both the chemical emissions affect the final spread of the loan contract. Given that the CEO's personal characters intervene in the bank's lending decisions, we extend this line of research by investigating whether the CEO's air pollution exposure during impressionable years may influence the bank's lending decisions. Our paper shows that borrowers with lower chemical emissions are more likely to receive a relatively lower loan rate in general, suggesting the borrower's environmental performance in terms of emission has critical financial implications. The financial implication of borrowers' emission is moderated by the bank CEO's personal pollution experience. Among the rapidly expanding literature on green lending, our research explores the role of bank top managers' experience in shaping the relationship between the borrower's air pollution and the cost of borrowing bank loans.

Lastly, we contribute to the literature that link the CEO's personal characteristics to the firm's risk-takings and profitability in the literature (Bernile et al. 2017; Bushman et al. 2018). Extending this line of research, we find that the CEOs experienced with more air pollution exposure in young adulthood generate higher tail risk and marginal expected shortfall but have not significant influence on the lending profitability in general.

The remainder of the paper is organized as follows. Section 2 explains the conceptual framework of main hypothesis development. Section 3 describes the sample, introduces inspection methodology, and provides descriptive statistics. Our baseline result is reported in Section 4 and analyses examining CEO air pollution exposure and other outcomes are presented in Section 5. Section 6 concludes.

2. Conceptual Framework

CEO's traits shape the top tune passed to lower branches and hence affect a bank's lending activities. The commercial loan level analysis by Hagendorff et al. (2022) shows that banks with trusting CEOs on average charge lower interest rates in U.S. syndicated loans by boosting the perceived credibility of borrower information and by mitigating contracting problems. Banks with overconfident CEOs are more likely to weaken the lending standards and increase leverage at the bank level (Ho et al. 2016). CEO's materialism could lower a bank's strength of risk management function and generate more downside tail risk (Bushman et al. 2018).[6] Contributing to this line of research, we examine whether CEO's air pollution exposure experience plays a role in setting the loan contract price charged by the managed bank.

The negative impacts of air pollution on human heath, cognition, and consequent economic costs have been analysed more comprehensively in psychological and economic studies than other types of pollutants such as wastes and water. Prior psychological studies suggest that air pollution has adverse impacts on contemporaneous human health and cognition. In the case of short-term air pollutant exposure, Kuenn et al. (2019) find that the increased indoor concentration of fine particulate matter influences people's cognitive performance

[6] Extant literature also sheds light on the impact of CEOs' personal traits on bank performance and risk management (Bushman et al. 2018; Ho et al. 2016; and King et al. 2016). For instance, the bank CEO's education attainment, both level and quality, matters to the bank performance as banks led by CEOs with MBA qualification commonly outperform industrial peers via diversifying income sources and reconfiguring loan composition (King et al. 2016). CEOs' managerial styles also explain a large part of the variation in firm capital structure and performance (Bertrand and Schoar 2003; Cronqvist et al. 2012).

negatively, which leads to a player's increased probability of making an erroneous move. Long-term air pollution exposure, meanwhile, is associated with the increased incidence of cardiovascular disease and death among postmenopausal women, impeded math and verbal test performance and future poverty among children, cognitive dysfunction among elders, and cardio-metabolic illness among all humanity (e.g., Lindstrom 2009; Münzel et al. 2017; Zhang et al. 2018; Persico 2020).

Apart from the negative effect on public health, air pollution would also affect local community the economy in terms of disordering labour force participation (Currie et al. 2014). Generally, air pollution could intensify the physiological arousal that could lead to behaviour bias. Short-term exposure to air pollution affects the group of highly skilled working performance negatively in decision-making (Archsmith et al., 2018). Adhvaryu et al.(2021) show that one standard deviation increase in fine particulate matter (PM) decreases hourly worker productivity by 1.6% of mean productivity.[7] Similarly, a 10 parts per billion change in average ozone exposure results in a significant and robust 5.5 percent change in agricultural worker productivity (Zivin and Neidell, 2012). Moreover, air pollution exposure would also impact investors behaviour in the financial market. For example, pollution exposure intensified the cognitive bias in the Chinese mutual fund market (Li et al., 2019). Long-term air pollution exposure would not only intensify investors' cognitive bias (Li et al. 2019) but also predict criminal and unethical behaviours by increasing anxiety (Lu et al., 2018).

Unfortunately, due to a lack of knowledge about the biology principles, it is not feasible for us to investigate how the health issues of CEOs caused by air pollution affect banks' lending decisions. But prior psychological and economic studies inspire us to wonder whether banks lead by CEOs with various air pollution exposures may have different attitudes toward

[7] Fine PM denotes the aerodynamic diameter range of tiny particles or droplets in the air is less than 2.5 μm (Adhvaryu et al., 2021).

borrowers with different levels of emission, which may be reflected in the loan contract prices. In our empirical examination on the impact of air pollution experienced by CEO on bank lending decisions, we face at least two challenges. First, it is difficult to gather sufficient data for CEO exposure to air pollution in their childhoods and adulthoods. Second, it is practically challenging to disentangle the mechanisms via which CEO's air pollution exposure may affect bank lending decision due to the impacts of air pollution on human cognition.

We tackle the first challenge by relying on CEO's exposure to pollution during their early adulthood according to the *Impressionable Years Hypothesis* well-grounded in social psychological literature (e.g., Carlsson and Karlsson 1970; Sears 1975; Visser and Krosnick 1998). This theory points out that the person's basic orientations formed during early adulthood will remain mostly unaltered later that the attitude change would remain low after the early adulthood passes. This conjecture is supported by empirical analyses tracking the dynamic life-stage attitude change and the influence of early-stage experience on subsequent decisions in the remaining life period. For example, the socialisation during the impressionable years orients young adults' thinking of the world views (e.g., Sears 1981; Sears 1983). Krosnick and Alwin (1989) further confirm the relationship between the age of 18-25 and an individual's political attitude.

In line with the *Impressionable Years Hypothesis*, we focus on the CEO's air pollution exposure during early adulthood and employ the data of local air quality over the time when the CEO took the undergraduate study. According to this hypothesis, the susceptibility of attitude will nearly come to stop after the period of early adulthood and will not interfere with the person's decision in the later life period, and hence the CEO's air pollution exposure in early adulthood could reasonably modify the person's attitude toward borrowers.

To disentangle the mechanisms via which CEO's air pollution exposure may affect bank lending decision, we argue that the CEO's exposure to air pollution during the

impressionable years may affect the attitude of bank CEO toward the emission level of borrowers in different ways as discussed below.

According to cognitive dissonance (Festinger 1957; Harmon-Jones and Mills 2019), bank CEO experiencing less pollution would treat borrowers with higher emissions as dissonance because such borrowers' pollution activities may be against the CEOs' value. Bank CEOs may reduce the dissonance by punishing borrowers' higher chemical emissions and provoke such borrowers' concern about environmental problems. Levinson (2012) describe that people most averse to air pollution choose to live in clean locales. Bank CEOs experienced more air pollution may become such "pollution-averse", as they have the most directly bad feeling of being exposed to bad air and consequently. In this scenario, bank CEOs averse to pollution would raise the price of loans borrowed by firms with a higher level of emissions as the penalty for pollution.

Moral rationalization literature (Tsang 2002; Umphress and Bingham 2011) suggests that the more pollution experience might lower the moral relevance to pollution. Moral rationalization may make it easier for bank CEOs to reinterpret their actions of charging borrowers with higher levels of emission less to be moral. It is likely that more pollution exposure during the impressionable years may also increase the CEO's tolerance of pollution, and banks managed by these CEOs in turn charge less to borrowers with higher emissions.

In addition to the implications from psychological theories, empirical analyses also offer evidence of people's attitudes towards air pollution. Banks generally tend to limit credit access for firms with more pollution (Reghezza and Altunbas 2022). However, people who are highly dependent economically on air pollution tend to be much less concerned about the local air pollution problem (Creer et al. 1970). If the air pollution experience during impressionable years permeates the bank CEOs with the importance of economic prosperity rather than the air

quality, banks with more air-pollution-exposed CEOs may not penalize borrowers with a high level of emission as much as those with CEOs with less exposure to air pollution.

Since above conjectures may lead to opposite predictions of the impact of CEO's pollution experience on bank loan price charged for borrowers with similar level of emission, we propose the hypothesis to be tested empirically in a null form:

Hypothesis: *Bank CEOs' air pollution exposure during the impressionable years has no moderating effect on the positive relationship between bank loan price and the emission level of the borrower.*

3. Data and Baseline Model

We provide below the description of air pollution exposure measurement, data sources, descriptive statistics, and the baseline model for our empirical analyses.

3.1. CEO's Air Pollution Exposure during Impressionable Years

According to *Impressionable Years Hypothesis*, we use the average TSPs in the location across the time when CEOs undertook their undergraduate studies to identify their air pollution exposure. Most CEOs in our samples took their undergraduate studies in the 1960s and 1970s. Therefore, among different kinds of air pollution indices, the statistics of TSPs are suitable for our research as the index has been regulated since 1971 and were monitored even before that time.[8] The EPA official website provides the county-level air quality indexes for TSPs from 1980. To get access to the full dataset, we file the Freedom of Information Act (FOIA) request and obtain the county-year level TSPs data dated back to 1955. The TSPs in the EPA's annual report are defined as particles of approximately 100 μm in diameter or less. The raw data reports the annual arithmetic mean of the TSPs index for each observation site in each county.

[8] The EPA revised the focus standard to PM_{10} (particles 10 μm in diameter or less) in 1987 and to $PM_{2.5}$ (particles 2.5 μm in diameter or less) ten years later (Anderson 2019). Both indexes have been adopted mostly in research that only requires data from recent decades (Zivin and Neidell 2012; Persico 2020).

We weigh the raw data by the weight of each site to calculate the yearly geometric mean of the reported initial values at the unit of county-year level.

The name of each bank CEO is collected from Compustat Execucomp database. Then, we manually identify the CEO's undergraduate university and study periods from multiple sources including NNDB.com, LinkedIn, prabook.com, or Google searches. The undergraduate study information is then linked to the TSPs raw data via the FIPS code and year in both datasets. The TSPs data we obtain from the FOIA request is dated back to the year 1955, while the TSPs data comprises many missing values for the first decade. This shrinks our samples that facilities issued by banks with CEOs' undergraduate finished before the accurate TSPs data are dropped. The ultimate air quality index is the arithmetic average mean index spanning the undergraduate study period with available data.[9] Additionally, we collect the university's data, such as Ivy League or not, and the CEO's other degree information, such as the major of the undergraduate study and MBA degree or not at the same time. We drop observations if the lender's CEO takes undergraduate study abroad, which takes approximately 3% of the raw CEO-level samples.

3.2. Borrower's Emission and Other Data

Following Shive and Forster (2020) and Akey and Appel (2021), we measure borrower's environmental performance using its total chemical emission collected from the EPA TRI program. The TRI program tracks the management of certain toxic chemicals that may threaten human health and the environment and provides more options than ESG profile or MSCI scores.[10] Companies' facilities that meet the following series of criteria are

[9] For example, if the bank CEO entered the university in 1960 and graduate in 1964, but the TSPs data is available for the years 1961 and 1962 for that county, we calculate the arithmetic average with the two year's values only.

[10] Hsu et al. (2018) state the coverage is not fairly limited since 1990. The TRI program now covers facilities that belong to certain industries, have more than ten employees and have chemical emissions above threshold, which implies facilities below such criteria are quite unlikely lead to any environmental problem and unlikely to trigger the CEO's attention on their chemical emission behaviours.

compulsory to report their annual TRI form to this program: (1) have 10 or more full-time employees (2) belong to mandatory industries (3) manufacture, process, or use TRI-listed chemicals, and (4) exceed any threshold of chemical category. [11] Facilities subject to the TRI form submission need to report the amount (in pounds) of chemical emissions under multiple categories, including that into the ground, air, and water. Hence, our chemical emission data is granular to distinguish borrowers' environmental profile.

Even though the TRI chemical emission data are self-reported, the literature suggests the accuracy of this dataset (Greenstone and Gallagher 2008; Akey and Appel 2020) that (1) companies will not be punished due to the emission as all categories of emission compulsory for the report are legal, and, (2) the TRI program itself is also working on improving the report accuracy via providing guidance and software support for reporting the data, making the data quality calls to facilities prior the report, and encouraging the issue of legal requirement for the data accuracy.[12] We aggregate plant (facility)-level toxic emission data at the unit of the parent company. To link emission information to parent companies' financial information, we use both the fuzzy match method and manual selection via the critical variable of company name to link this dataset to DealScan facility contracts.[13]

Our final matched sample consists of 918 parent companies and 3,915 facilities. The *Borrower Emission* reports the ratio of total emissions scaled by the borrower's asset at the parent company-year level. For the full sample, the average reported parent companies' total emission is 32 thousand pounds per year with 21.2% reporting no chemical emissions.

[11] More details on https://www.epa.gov/toxics-release-inventory-tri-program/tri-compliance-and-enforcement
[12] For more details refers to https://www.epa.gov/toxics-release-inventory-tri-program/tri-data-quality
[13] Before conducting the link work, we standardize abbreviations of company names (e.g., " FINL " to "FINANCIAL", " INTL" to "INTERNATIONAL", etc.), correct misspelled words (e.g., " INDUSTRYUSTRIES " to " INDUSTRIES ", " INDUSTRYUSTRYUSTRIAL" to " INDUSTRIAL", etc.) and remove special symbols (e.g., ".", " & ", etc.). We use the STATA command to diagnose the common suffixes (e.g., "CORPORATION", " ENTERPRISE ", etc.) and remove these during the matching procedure.

We obtain the borrower's financial information from Compustat and link it to the DealScan data following Chava and Roberts's（2008) DealScan-Compustat link file, of which the most recent version is 17 April 2018. We manually link the more recent observations in the latter half of 2018. Table 1 reports the statistics. On average, borrowers have approximately 2.6 billion dollars in book assets with a mean ROA of 9.5%, a leverage ratio of 0.658, and a Z-score of 1.852.

Commercial loan contract data are collected from the DealScan for the sample period of 1992-2018. Our sample is restricted to loans issued by banks and borrowers headquartered in the U.S. We focus on lead arrangers because they play a primary role in determining loan contract terms and the lender that takes up the most fraction of the loan facility contract is treated as the leader if there is no lead arranger. We construct the final loan contract data at the facility level. The average loan spread in our sample is 181 base points, with 42.5% and 53.9% of the loan facilities requiring borrowers to meet collateral and financial covenant requirement respectively. Solo lenders only issue 10% of loans in our sample. We collect Bank Holding Companies (BHCs) financial information from the Bank Regulatory and the Y-9C form (Consolidated Financial Statements for Bank Holding Companies) and merge the data to the DealScan dataset using Schwert's (2018) lender link table using the version updated on 13 April 2020. We obtain data on bank governance and bank CEO characteristics such as age, tenure length, and CEO/Chair Duality from RiskMetrics, Execucomp, and Boardex.

Table 1 also reports the summary statistics of the average TSPs index and the *CEO pollution exposure* in counties where universities locate in our samples. The average TSPs index is 113μg/m^3 with a maximum value of 292μg/m^3 and a standard deviation of 77. For instance, the average TSPs in Orange County in the year of 1972 is 43, while the index in New York County in the year of 1957 is 198, which is three times more than the former county. Additionally, banks of our samples have an average asset of 22 billion with an average ROA

of 0.9%, leverage of 0.9, fraction of lending 0.6, fraction of deposit 0.7, and the ratio of tier-1 capital 0.08.

[Insert Table 1 about here]

3.3 Baseline Regression Model

To examine whether the CEO's air pollution exposure affects the banks' decision on the borrower's lending cost, we measure the borrower's greenness value by using the total emission proxy and examine if the CEO's pollution experience would influence the bank's evaluation of the greenness value in the loan agreement. Our baseline regression follows:

$$Spread_i = \beta_0 + \beta_1 Borrower\ emission_i + \beta_2 CEO\ pollution\ exposure_i + \beta_3 Borrower\ emission_i * CEO\ pollution\ exposure_i + Control_i + FE_i + \varepsilon_i \quad (1)$$

where $Borrower\ emission_i$ indexes the borrower's chemical emission that captures the borrower's environmental performance in the *i*th facility contract, and $CEO\ pollution\ exposure_i$ is the CEO's average air pollution exposure over the undergraduate study time. *Controls* in Equation (1) denote groups of loan contract terms and the borrower's information, and particularly, the borrower financial indexes are lagged for one year, i.e., one year before when the facility contract starts. We include loan type, loan purpose (Berg et al. 2016), and the state where the party's principal executive office locates fixed effects to absorb the loan-specific invariant heterogeneity. We also include borrower industry, borrower credit rating, and lender fixed effects in the regression to control for unobservable invariant heterogeneity at the borrower characteristics and lender level, respectively. We include these fixed effects in steps to examine if the results are consistent across all specifications in the baseline test.

The coefficient of main interest β_3 estimates the moderating effect of the CEO's different air pollution exposure on the bank's lending decisions of loan price. The contrast between coefficients for borrower's environmental performance and the interaction capture the

heterogeneity of how CEOs with different pollution exposure impacts the bank's evaluation of the borrower's greenness value. We cluster the robust standard error at the bank level throughout all analyses.

We include several groups of control variables for elements that may determine the loan price the borrower receives ultimately as well. We firstly control loan contract terms including the amount, the maturity, the collateral requirement (Ertan 2021), the existence of financial covenants, and the condition if the loan is issued by a single lender of each facility. We also control for borrowing firm characteristics such as firm size, ROA (Ramelli et al. 2021), current ratio, tangibility, leverage ratio, and z-score. In robustness tests, we further control for supplementary groups of potentially omitted variables for other CEOs' traits, such as age, tenure length, MBA degree, Ivy League graduation, and CEO/chair duality structure in the bank by steps. For the bank-level characteristics, we include the board size and independence in the regression, which might limit the CEO's crucial power in the contract negotiating and decision-making procedure. Lastly, we control for the bank's county-level local geographics in the robust examinations. Appendix 1 defines all variables used in our empirical analyses and specifies their data sources.

4. Main Empirical Results

4.1. Baseline Regression for the Effect of CEOs' Exposure to Air Pollution on Loan Price

We first analyze the impact of CEOs' air pollution exposure on loan price by examining if borrowers with higher emissions benefit from loan prices from banks whose CEOs had more pollution exposure.

Table 2 reports the effect of the CEO's exposure on the borrower's cost according to their chemical emissions following Equation (1). The dependent variable is the spread the borrower pays for the loan in basis points over the London Interbank Offered Rate, called

allindrawn in the DealScan in each facility contract (Malmendier et al. 2022). The independent variable of our interest is the average annual air quality index of TSPs interacted by borrowers' amount of total emission scaled by total assets at the company level. The coefficient for this interaction term of CEOs' air pollution exposure and borrower emission is of our primary interest as discussed previously. Results reported in Columns (1)-(3) consistently indicate the role of the CEO's personal pollution exposure in the credit price decision procedure.[14] Consistent with Chen et al. (2019) and Degryse's et al. (2020), our finding shows that firms' environmental performance influences their credit cost shown by positive β_1. The consistently significant coefficients of β_3 reported in these columns demonstrate that banks with CEOs exposed to more pollution give relatively lower prices to borrowers with higher emissions than those with less pollution exposure ($\beta_3 < 0$). The coefficient of paramount interest β_3 is -0.371 within all fixed effects levels in the last column of Table 2, indicating a standard deviation increase of the average air quality index where CEOs spent their impressionable years translates to a 29 basis points decrease of average loan price for borrowers with higher emissions. Hence, from the borrower's perspective, while it is very likely that borrowers with poorer environmental performance would be charged higher loan prices, these firms on average are penalized less by banks with CEOs experiencing more air pollution during the impressionable years. Based on our baseline regression results, we are therefore confident to reject the prediction of the null hypothesis that bank CEOs' air pollution exposure during the impressionable years has no moderating effect on the positive relationship between bank loan price and the emission level of the borrower. Generally, loan contracts with larger amount, no requirement for collateral, and stricter requirement for financial covenant have lower spread;

[14] We also conduct regressions with CEO pollution exposure as the independent variable only. The result indicates that the CEO's pollution exposure does not impact the lending price forthrightly as β_2 is not statistically significant across all specifications in this test. Hence, the heterogeneity of borrowers' credit cost does not seem to be affected by the CEOs air pollution exposure during their impressionable years directly.

borrowers of higher profitability, lower leverage, and less credit risk enjoy benefit of borrowing money from the bank.

[Table 2 around here]

4.2. Robustness Checks

We conduct several tests to address the robustness of the evidence from the baseline regressions using alternative measures for main variables (Section 4.2.1) and adding further controls (Section 4.2.2).

4.2.1. Alternative Measures for Bank CEO Air Pollution Exposure and Borrower Emission

In Table 3, we report the results for the baseline regressions with alternative measures, including alternative formats of the CEO air pollution exposure proxy, extreme cases of air pollution, and scaling the borrower emission index differently.

In Column (1), we replace the CEO air pollution exposure index with the alternative natural logarithmic format of the original TSPs values to adjust the skewness and eliminate the heteroscedasticity. In Columns (2) and (3), we measure the CEO air pollution exposure by calculating the index with the annual 75th and 90th percentile of TSPs readings, respectively, to address the concern that the effect arises from the extreme cases. In Column (4), we scale the emission proxy by the firm's sales alternatively instead of assets to check the evidence robustness.[15] The magnitude of the CEO's experience on the bank's offered loan prices for borrowers with higher emissions is consistent across specifications in Columns (1)-(3), and the significance remains consistent for the last examination. Control variables and fixed effects included in the regression are held as previously.

[Table 3 around here]

4.2.2. Further Controls

[15] The proxy of CEO air pollution exposure with arithmetic mean, maximum of 75th and 90th values have high collinearity in our sample.

To address the concern that, borrowers with higher emissions' benefit of lower loan price may systematically result from characteristics that "dominate" the CEO's pollution exposure or are highly correlated with the proxy, we augment the regression with additional variables to control for potentially omitted parts. We address this concern by adding three proxy categories in the baseline specification: CEO characteristics, bank board structure features, and the bank's local geographics.

We firstly control the CEO's distinctive traits, including age, tenure length, MBA degree, Ivy League, CEO/chair duality, and CEO overconfidence by steps, all of which could probably impact the CEO's management style and intervene in the bank's loan price decisions according to prior literature. Results including the control for CEO characteristics are presented in Panel A of Table 4. Particularly, MBA here is a dummy equals 1 if the CEO holds an MBA degree, Ivy League takes 1 if the CEO graduates from the university if it belongs to the Ivy League (Nguyen et al. 2018), and CEO/Chair Duality is also a dummy equal to 1 if the CEO is also the bank's chairman (Nguyen et al., 2015). We control the CEO overconfidence following Campbell et al. (2011) that CEOs hold stock options that are more than 100% in the money are defined as overconfidence. We construct the interaction term for each potentially significant variable with the borrower's greenness proxy to check the existence of loan price heterogeneity. Our baseline results of the CEO's intervention effect remain robust across these checks, validating the effect we observe in the baseline analysis.

We then include additional bank board governance indexes in the baseline to address the concern that our results are driven by the bank's governance characteristics rather than the influence of the CEO. We perform the robustness check by controlling for board size and board independence, as well as the interaction terms to the borrower's emission index. The result reported in Panel B of Table 4 shows largely similar results to our baseline test.

Another concern is about the potential link between certain banks' location and their decisions on loan prices based on borrowers' environmental performance. In that case, it is the geographic rather than the CEO's pollution exposure that impacts the bank's evaluation of the borrower's greenness and the final price decisions. We address this concern by controlling for the bank's local county-level information, including population, income per capita, number of non-profit organizations, the number of social organizations (Hagendorff et al. 2022), and the interactions of each variable with the borrower's emissions. We obtain results consistent with the baseline regressions with these additional controls as shown in Panel C of Table 4.[16]

[Table 4 around here]

In addition to the robustness checks with alternative measurements and additional control, we conduct identification check (Section 4.3.) and further tests for credit allocation between green vs. non-green industries (Section 4.4.).

4.3. Identification Check

To examine the causality between the CEO's pollution exposure during the impressionable years and the loan price to borrowers in line with their environmental performance, we examine how the exogenous change of concerns about gas emissions influences the correlation we have found in the baseline.

A series of salient climate events happen after the financial crisis of 2007-2009, such as the Doha UN Climate Change Conference, the Paris Agreement, and Trump's withdrawal from the Paris Agreement. According to the Wall Street Journal Climate Change News Index created by Engle et al. (2020), the intensity of climate news coverage surges in the year 2014 when the EPA Climate Change Initiative starts with the coincidence of the released 3rd National Climate Assessment. The EPA publishes the 2014-2018 strategic plan that addresses climate

[16] https://aese.psu.edu/nercrd/community/social-capital-resources. The Northeast Regional Centre for Rural Development provides social capital data for the years 1990, 1997, 2005, 2009, and 2014.

change and improving air quality. Among all significant events, the 2014 EPA's Climate Change Initiative matters to our observed borrowers supervised by the EPA and draws concern on firms' climate change and related regulative risk.

The EPA's 2014-2018 strategic plan starts with its large-scale efforts to reduce greenhouse gas emissions after President Obama announced his Climate Action Plan. Three pillars to support the plan include the released Climate Change Adaptation Plan, the proposed Clean Power Plan, and the focus on strengthening international leadership for dealing with climate impacts (Tubman 2015). According to Tubman's (2015) introduction, by the end of October 2014, there are 38 states that already release their final Climate Change Adaptation Plans; meanwhile, the government takes several steps to reduce carbon pollution from 2014 in oil, gas, coal mines, and other sectors following the main objective of the Clean Power Plan. Hence, we check if the surge of plans and projects that focusing on the climate impact starting from 2014 shifts the CEO's prospect on borrowers with higher emissions by investigating the cross-sectional evidence of the baseline.

It is assumed that the CEO would recognize the importance of environmental performance and re-assess the regulatory challenges borrowers with higher emissions face after the EPA's initiative of climate change concern and air quality improvement; thus, if the previous benefit to borrowers with higher emissions stems from the CEO's more pollution exposure, the relationship may disappear after the compulsory objective relating to pollutants emission reduction comes into effect. Hence, the relationship between the CEO's pollution exposure and the lower loan price to borrowers with higher emissions will not be held in the post-regulation period.

To investigate the causality evidence, we create the triple interaction with the borrower's emission, the CEO's air pollution exposure, and the dummy *Post2014* that takes 1 for loan contracts start after 2014. We narrow loan contracts starts from the year 2011 to 2017 excluding

2014 to eliminate other potential elements that might bias our result.[17] To this end, we estimate the regression model (2) where our primary interest is the comparison between β_3 and β_6. Control variables and fixed effects in the regression are consistent with the baseline.

As shown in Table 5, the coefficient β_3 remain negative and significant in all specifications. Meanwhile, the coefficient β_6 on the $Borrower\ emission_i * CEO\ pollution\ exposure_i * Post2014_i$ are significantly positive, providing evidence that, with the arising attention on borrowers' environmental performance, the benefit in loan price to borrowers with higher emissions from banks with more exposed CEOs is eliminated. Even though experiencing severe air pollution during their early life, CEOs would punish borrowers for their bad environmental performance emission since the pollutant's emission comes under regulation and the emission reduction becomes compulsory.

[Table 5 around here]

4.4. **CEO Air Pollution Exposure and Non-price Loan Terms**

There is little to no evidence in extant literature on whether CEOs' pollution experience

$$\begin{aligned} Spread_i = {} & \beta_0 + \beta_1 Borrower\ emission_i + \beta_2 CEO\ pollution\ exposure_i \\ & + \beta_3 Borrower\ emission_i * CEO\ pollution\ exposure_i \\ & + \beta_4 Borrower\ emission_i * Post2014_i \\ & + \beta_5 CEO\ pollution\ exposure_i * Post2014_i \\ & + \beta_6 Borrower\ emission_i * CEO\ pollution\ exposure_i \\ & * Post2014_i + Control_i + FE_i + \varepsilon_i \end{aligned} \quad (2)$$

may influence banks' non-price terms in the loan agreements to borrowers in line with their pollutant emissions. We examine such relationships in this section.

[17] Series of regulations and acts directed by the EPA have been settled down gradually combating the pollution and climate change issues since 2014. However, the Trump administration proposes to scrap the CPP at the end of 2017 ("Trump Administration Will Propose Repealing Obama's Key Effort to Combat Climate Change - The Washington Post"), and quits the Paris Agreement in June, 2017, which may add noise to commercial loan observations negotiated in the late of 2017 and after the year.

We check whether green CEOs impose strict non-price terms on borrowers with higher emissions. It is assumed loan agreements issued by lenders with more exposed CEOs tend to release the non-price terms to borrowers with higher emissions. The regression equation follows the format of Equation (1) by replacing the dependent variable with non-price terms in the loan contract.

We report the non-price term test results in Table 6. Non-price terms in the loan contract include financial covenants (Nini et al. 2009), facility amount, loan maturity, and collateral requirement (Qian and Strahan 2007). Against the previous assumption, our findings show that banks with more exposed CEOs are more likely to require the collateral and offer short maturity for contracts issued to borrowers with higher emissions. As Berlin and Loeys (1988) and Berlin and Mester (1992) point out, banks use non-price terms to facilitate monitoring and limit credit losses, and Strahan (1999) confirms that non-price terms are used to control the borrower's risk. Thus, the CEO's pollution experience drives the lender to focus more on the collateral security and liquidity rather than the financial covenants. In addition, the mostly insignificant effect of bank CEO pollution exposure on non-price term of syndicated loans is not surprising given that each non-price term could not be settled independently, as they may be decided interdependently (Bharath et al. 2011).

[Table 6 around here]

5. CEO Air Pollution Exposure, Credit Allocation, and Bank Performance

5.1 Credit allocation between green vs. non-green industries

So far, our empirical analysis suggests that prices of loans granted by lenders with more exposed CEOs to borrowers with higher emissions are averagely lower. An intuitively follow up question is whether the CEO's pollution exposure influence the bank's capital allocation decision as well. To test this, we conduct additional analysis to assesses how the CEO's experience affects the lending volumes among green and non-green industries.

To ascertain whether CEOs with more pollution exposure influence lenders to allocate more credit liquidity to borrowers with higher emissions, we develop the following regression Equation (3):

$$\begin{aligned} Fraction\ of\ lending\ Volume_{ijt} \\ = \alpha + \beta_1 listed\ industry_i + \beta_2 CEO\ pollution\ exposure_{ij} \\ + \beta_3 listed\ industry_i * CEO\ pollution\ exposure_{ij} + Control_i \\ + FE_i + \varepsilon_i \end{aligned} \quad (3)$$

where the ratio of lending volume for each industry is denoted by *i*, banks by *j*, and year by *t*. Following Giannetti and Saidi's (2019) proxy construction method, the dependent variable $Fraction\ of\ lending\ Volume_{ijt}$ in the analysis denotes the ratio of the total facility amount for industry i from the bank j in year t over the total loan volume originated by bank j in year t. $Listed\ industry_i$, particularly, is a dummy equal to 1 if the industry is included in the EAP TRI program regulation. Facilities complying with the report obligation are typically larger plants belonging to manufacturing, metal mining, electric power generation, chemical manufacturing, and so on, and the EPA lists the SCI codes covering facilities that should be involved in the program self-report.[18] FE_i is a vector of the average characteristics of industry *i* which the borrower belongs to. We control for the borrowing industry's average financial proxies to capture the cross-industry heterogeneity that could essentially impact the lending volumes to each industry. All proxies are one year lagged and winsorized at the 1% for both tails.[19] We also include lender and industry-period fixed effects to control invariant and unmeasurable lender and industry-time-specific factors. Robust standard errors are clustered at the bank level.

[18] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-J/part-372#372.23
[19] All detailed definitions for the variables adopted are displayed in Appendix 1.

The paramount coefficient of interest is β_3. A different sigh for β_3 from β_1 indicates the moderate effect of the CEO's pollution exposure in the lender's credit allocation decisions. Table 6 performs the empirical test on lending volumes. Negative coefficients β_1 in the first and second columns show that banks offer less fraction of credit to non-green industries commonly, while the significantly positive β_3 in all columns tell that banks with CEOs who ever experience more air pollution during their impressionable years are willing to offer more credit to borrowers regulated by the chemical pollutants release program. We tighten the investigation by adding the additional industry fixed effect in Column (2). β_3 is significantly positive and the magnitude remains identical across all checks.

[Table 7 around here]

5.2 Bank Performance

We further examine if the bank CEO's pollution exposure influences the bank's risk-takings and profitability. Follow the definitions of *Tail Risk* and *Marginal Expected Shortfall* in Bushman et al. (2018) and Chu et al. (2020), we report the relationship between the CEO's pollution exposure and risk-takings in Columns (1) and (2) of Table 8. The regression following a simplified form of Equation (1) where the dependent variables are replaced with *Tail Risk* and *Marginal Expected Shortfall* and the independent variable of our interest is the CEO air pollution exposure. The evidence of significant β_3 consistently across all specifications indicates a negative relationship between the CEO's pollution exposure and the strength of the bank's risk management. The results for the association between the pollution exposure and the bank's profitability reported in Columns (3) and (4) of Table 8 show marginal evidence of the CEO's more pollution exposure and the bank's higher loan interest income, but the general profitability is not related to the bank CEO's pollution exposure experience.[20]

[20] The unit of the regression for Table 8 is bank-year. Some banks do not have either the CEO pollution exposure index or financial statement for some years, which shrinks the number of observations we have for this test.

[Table 8 around here]

6. Conclusions

An increasing group of studies on firms' environmental performance and loan contracts confirms that firms face obstacles to borrow money from banks for being non-green (Chen et al. 2021; Reghezza and Altunbas 2022). These studies posit the relationship between borrowers' environmental performance and their subsequent credit cost to borrow money from banks.

In this paper, we focus on the role of the CEO's personal traits in banks' lending decisions, and we examine, particularly, whether the borrower's greenness value is attached to the loan by banks with different CEO pollution exposure. We conjecture that banks managed by CEOs exposed to air pollution more during their impressionable years are more likely to charge lower prices to borrowers with higher emissions. By employing commercial loans from 1992 to 2018 in the US market, we prove the group of lenders whose CEOs are more exposed to air pollution attach less greenness value or impose less punishment, to borrowers with higher emissions. To establish the causality, we take the variation of the EPA Climate Change Initiative starts with the coincidence of the released 3rd National Climate Assessment as the exogenous resource and find that the rising concern about pollutants emission reverses the effect of CEOs' pollution exposure on loan price granted to borrowers. Generally, all banks in our sample assess the borrower's environmental consciousness in their lending decision after the pollutant comes under national regulation. Furthermore, lenders with CEOs more exposed to air pollution in impressionable years are likely to allocate more credit to non-green industries that are under the supervision of the EPA. Our results are robust with additional control factors and alternative measurements for bank CEO's exposure to air pollutions and borrowers' emission. Lastly, the bank CEO's pollution exposure is negatively associated with the strength of the bank's risk management.

Our research exploits the element leading to the lending heterogeneity in valuing firms' environmental issues. This gives the inspiration to banks to involve additional standards and aspects during the environmental performance assessment procedure.

References:

Adhvaryu, Achyuta, Namrata Kala, and Anant Nyshadham. 2021. “Management and Shocks to Worker Productivity.” *Journal of Political Economy* 130 (1).

Akey, Pat, and Ian Appel. 2020. “Environmental Externalities of Activism.” *SSRN Electronic Journal* 1 (647).

———. 2021. “The Limits of Limited Liability: Evidence from Industrial Pollution.” *Journal of Finance* 76 (1): 5–55.

Anderson, Michael L. 2019. “As the Wind Blows: The Effects of Long-Term Exposure to Air Pollution on Mortality.” *Journal of the European Economic Association* 0 (0): 1–42.

Archsmith, James, Anthony Heyes, and Soodeh Saberian. 2018. “Air Quality and Error Quantity: Pollution and Performance in a High-Skilled, Quality-Focused Occupation.” *Journal of the Association of Environmental and Resource Economists* 5 (4): 827–63.

Arena, Claudia, Giovanna Michelon, and Grzegorz Trojanowski. 2018. “Big Egos Can Be Green: A Study of CEO Hubris and Environmental Innovation.” *British Journal of Management* 29 (2): 316–36.

Berg, Tobias, Anthony Saunders, and Sascha Steffen. 2016. “The Total Cost of Corporate Borrowing in the Loan Market: Don’t Ignore the Fees.” *Journal of Finance* 71 (3): 1357–92.

Berlin, Mitchell, and Jan Loeys. 1988. “Bond Covenants and Delegated Monitoring.” *The Journal of Finance* 43 (2): 397–412.

Berlin, Mitchell, and Loretta J. Mester. 1992. “Debt Covenants and Renegotiation.” *Journal of Financial Intermediation* 2 (2): 95–133.

Bernile, Gennaro, Vineet Bhagwat, and P. Raghavendra Rau. 2017. “What Doesn’t Kill You Will Only Make You More Risk-Loving: Early-Life Disasters and CEO Behavior.” *Journal of Finance* 72 (1): 167–206.

Bertrand, Marianne, and Antoinette Schoar. 2003. “Managing with Style: The Effect of Managers on Firm Policies.” *The Quarterly Journal of Economics* 118 (4): 1169–1208.

Bharath, Sreedhar T., Sandeep Dahiya, Anthony Saunders, and Anand Srinivasan. 2011. *Lending Relationships and Loan Contract Terms*. *Review of Financial Studies*. Vol. 24.

Bushman, Robert M, Robert H Davidson, Aiyesha Dey, and Abbie Smith. 2018. “Bank CEO Materialism: Risk Controls, Culture and Tail Risk.” *Journal of Accounting and Economics* 65 (1): 191–220.

Campbell, T. Colin, Michael Gallmeyer, Shane A. Johnson, Jessica Rutherford, and Brooke W. Stanley. 2011. “CEO Optimism and Forced Turnover.” *Journal of Financial Economics* 101 (3): 695–712.

Carlsson, Gosta, and Katarina Karlsson. 1970. “Age, Cohorts and the Generation of Generations.” *American Sociological Review* 35 (4): 710.

Chang, Tom, Joshua Graff Zivin, Tal Gross, and Matthew Neidell. 2016. “Particulate Pollution and the Productivity of Pear Packers.” *American Economic Journal: Economic Policy* 8 (3): 141–69.

Chava, Sudheer, and Michael R. Roberts. 2008. “How Does Financing Impact Investment? The

Role of Debt Covenants." *Journal of Finance* 63 (5): 2085–2121.

Chen, I. Ju, Iftekhar Hasan, Chih Yung Lin, and Tra Ngoc Vy Nguyen. 2021. "Do Banks Value Borrowers' Environmental Record? Evidence from Financial Contracts." *Journal of Business Ethics* 174 (3): 687–713.

Chen, Tao, Chen Lin, and Jianfei Zhu. 2021. "CEO Social Minds and Green Loans." *SSRN Electronic Journal*, no. June.

Chin, M. K., Donald C. Hambrick, and Linda K. Treviño. 2013. "Political Ideologies of CEOs: The Influence of Executives' Values on Corporate Social Responsibility." *Administrative Science Quarterly* 58 (2): 197–232.

Choy, Stacey, Shushu Jiang, Wei-Yi (Scott) Liao, and Emma Wang. 2021. "Public Environmental Enforcement and Private Lender Monitoring: Evidence from Environmental Covenants." *SSRN Electronic Journal*.

Chu, Yongqiang, Saiying Deng, and Cong Xia. 2020. "Bank Geographic Diversification and Systemic Risk." *Review of Financial Studies* 33 (10): 4811–38.

Creer, Ralph N., Robert M. Gray, and Michael Treshow. 1970. "Differential Responses to Air Pollution as an Environmental Health Problem." *Journal of the Air Pollution Control Association* 20 (12): 814–18.

Cronqvist, Henrik, Anil K. Makhija, and Scott E. Yonker. 2012. "Behavioral Consistency in Corporate Finance: CEO Personal and Corporate Leverage." *Journal of Financial Economics* 103 (1): 20–40.

Currie, Janet, Joshua Graff Zivin, Jamie Mullins, and Matthew Neidell. 2014. "What Do We Know About Short- and Long-Term Effects of Early-Life Exposure to Pollution?" *Annual Review of Resource Economics* 6 (1): 217–47.

Degryse, Hans, Roman Goncharenko, Carola Theunisz, and Tamas Vadasz. 2020. "When Green Meets Green." *SSRN Electronic Journal*.

Engle, Robert F, Stefano Giglio, Bryan Kelly, Heebum Lee, and Johannes Stroebel. 2020. "Hedging Climate Change News." *The Review of Financial Studies* 33 (3): 1184–1216.

Ertan, Aytekin. 2021. "Real Earnings Management through Syndicated Lending." *Review of Accounting Studies*.

Festinger, Leon. 1957. *A Theory of Cognitive Dissonance*. Vol. 2. Stanford university press.

Giannetti, Mariassunta, and Farzad Saidi. 2019. "Shock Propagation and Banking Structure." *The Review of Financial Studies* 32 (7): 2499–2540.

Giuliano, Paola, and Antonio Spilimbergo. 2014. "Growing up in a Recession." *Review of Economic Studies* 81 (2): 787–817.

Greenstone, Michael, and Justin Gallagher. 2008. "Does Hazardous Waste Matter? Evidence from the Housing Market and the Superfund Program." *The Quarterly Journal of Economics*. Oxford Academic.

Hagendorff, Jens, Sonya S. Lim, and Duc Duy Nguyen. 2022. "Lender Trust and Bank Loan Contracts." *Management Science*, no. 0025–1909: 1–22.

Harmon-Jones, Eddie, and Judson Mills. 2019. "An Introduction to Cognitive Dissonance Theory and an Overview of Current Perspectives on the Theory." *Cognitive Dissonance:*

Reexamining a Pivotal Theory in Psychology (2nd Ed.)., 3–24.

Ho, Po Hsin, Chia Wei Huang, Chih Yung Lin, and Ju Fang Yen. 2016. "CEO Overconfidence and Financial Crisis: Evidence from Bank Lending and Leverage." *Journal of Financial Economics* 120 (1): 194–209.

Kleimeier, Stefanie, and Michael Viehs. 2016. "Carbon Disclosure, Emission Levels, and the Cost of Debt." *SSRN Electronic Journal*, 1–42.

Krosnick, Jon A, and Duane F. Alwin. 1989. "Aging and Susceptibility to Attitude Change." *Journal of Personality and Social Psychology* 57 (3): 416–25.

Kuenn, S., J. Palacios, and N. Pestel. 2019. "Indoor Air Quality and Cognitive Performance." *IZA Discussion Paper No 12632*.

Levinson, Arik. 2012. "Valuing Public Goods Using Happiness Data: The Case of Air Quality." *Journal of Public Economics* 96 (9–10): 869–80.

Lewis, Ben W., Judith L. Walls, and Glen W. S. Dowell. 2014. "Difference in Degrees: CEO Characteristics and Firm Environmental Disclosure." *Strategic Management Journal* 35: 712–722.

Li, Jennifer (Jie), Massimo Massa, Hong Zhang, and Jian Zhang. 2019. "Air Pollution, Behavioral Bias, and the Disposition Effect in China." *Journal of Financial Economics*, no. xxxx.

Lindstrom, Swine. 2009. "Long-Term Exposure to Air Pollution and Incidence of Cardiovascular Events in Women Kristin." *The New England Journal of Medicine* 360 (25): 2605–15.

Lu, Jackson G., Julia J. Lee, Francesca Gino, and Adam D. Galinsky. 2018. "Polluted Morality: Air Pollution Predicts Criminal Activity and Unethical Behavior." *Psychological Science* 29 (3): 340–55.

Malmendier, Ulrike, Vincenzo Pezone, and Hui Zheng. 2022. "Managerial Duties and Managerial Biases." *Management Science*.

Münzel, Thomas, Mette Sørensen, Tommaso Gori, Frank P. Schmidt, Xiaoquan Rao, Frank R. Brook, Lung Chi Chen, Robert D. Brook, and Sanjay Rajagopalan. 2017. "Environmental Stressors and Cardio-Metabolic Disease: Part II-Mechanistic Insights." *European Heart Journal* 38 (8): 557–64.

Murphy, Gardner, Theodore M. Newcomb, Kathryn E. Koenig, Richard Flacks, and Donald P. Warwick. 1969. "Persistence and Change: Bennington College and Its Students after 25 Years." *American Educational Research Journal* 6 (1): 119.

Nguyen, Duc Duy, Jens Hagendorff, and Arman Eshraghi. 2018. "Does a CEO's Cultural Heritage Affect Performance under Competitive Pressure?" *Review of Financial Studies* 31 (1): 97–141.

Nguyen, Duc Duy Louis, Jens Hagendorff, and Arman Eshraghi. 2015. "Which Executive Characteristics Create Value in Banking? Evidence from Appointment Announcements." *Corporate Governance: An International Review* 23 (2): 112–28.

Nini, Greg, David C. Smith, and Amir Sufi. 2009. "Creditor Control Rights and Firm Investment Policy." *Journal of Financial Economics* 92 (3): 400–420.

Persico, Claudia. 2020. "Can Pollution Cause Poverty ? The Effects of Pollution on

Educational , Health and Economic Outcomes," no. 12965.

Qian, Jun, and Philip E. Strahan. 2007. "How Laws and Institutions Shape Financial Contracts: The Case of Bank Loans." *Journal of Finance* 62 (6): 2803–34.

Quan, Xiaofeng, Yun Ke, Yuting Qian, and Yao Zhang. 2021. "CEO Foreign Experience and Green Innovation: Evidence from China." *Journal of Business Ethics*, no. 0123456789.

Ramelli, Stefano, Alexander F Wagner, Richard J Zeckhauser, and Alexandre Ziegler. 2021. "Being Stranded with Fossil Fuel Reserves? Climate Policy Risk and the Pricing of Bank Loans." *SSRN Electronic Journal*.

Reghezza, Alessio, and Yener Altunbas. 2021. "Do Banks Fuel Climate Change?" *SSRN*.

Ryder, Norman B. 1965. "The Cohort as a Concept in the Study of Social Change." *American Sociological Review* 30: 843–61.

Schwert, Michael. 2018. "Bank Capital and Lending Relationships." *Journal of Finance* 73 (2): 787–830.

Sears, David O. 1975. "Political Socialization." In *Handbook of Political Science*, 2:93–153. Reading, MA: Addison-Wesley.

———. 1981. "Life-Stage Effect on Attitude Change. Especially among the Elderly." In *Kiesler, S.B., Morgan, J.N. and Oppenheim, V.K. (Eds) Aging : Social Change*, 183–204. New York: Academic Press. http://books.google.de/books?id=ClBHAAAAMAAJ.

———. 1983. "The Persistence of Early Political Predispositions : The Roles of Attitude Object and Life Stage." In *Personality and Social Psychology Review*, 79–116. Beverly Hills.

Shive, Sophie A, and Margaret M Forster. 2020. "Corporate Governance and Pollution Externalities of Public and Private Firms*." *The Review of Financial Studies* 33 (3): 1296–1330.

Strahan, Philip E. 1999. "Borrower Risk and the Price and Nonprice Terms of Bank Loans." *SSRN Electronic Journal*.

"SUPREME COURT OF THE UNITED STATES." 2007. https://www.law.cornell.edu/supct/pdf/05-1120P.ZD.

"Trump Administration Will Propose Repealing Obama's Key Effort to Combat Climate Change - The Washington Post." n.d. Accessed November 20, 2021. https://www.washingtonpost.com/news/energy-environment/wp/2017/10/05/trump-administration-will-propose-repealing-obamas-key-effort-to-combat-climate-change/.

Tsang, Jo Ann. 2002. "Moral Rationalization and the Integration of Situational Factors and Psychological Processes in Immoral Behavior." *Review of General Psychology* 6 (1): 25–50.

Tubman, Michael. 2015. "President Obama's Climate Action Plan: Two Years Later." *The Guardian*, no. June: 1–18. http://www.theguardian.com/environment/2015/jun/25/barack-obama-climate-change-legacy%5Cnpapers3://publication/uuid/8AF03876-1824-482D-9358-FEE19F0F44BB.

Umphress, Elizabeth E., and John B. Bingham. 2011. "When Employees Do Bad Things for Good Reasons: Examining Unethical pro-Organizational Behaviors." *Organization Science* 22 (3): 621–40.

Zhang, Xin, Xi Chen, and Xiaobo Zhang. 2018. “The Impact of Exposure to Air Pollution on Cognitive Performance.” *Proceedings of the National Academy of Sciences of the United States of America* 115 (37): 9193–97.

Zivin, Joshua Graff, and Matthew Neidell. 2012. “The Impact of Pollution on Worker Productivity.” *American Economic Review* 102 (7): 3652–73.

Appendix 1: Definitions of Variables

Variables	Definition	Source
Borrower emission	Total chemical emission for each parent company scaled by company's total asset (/100)	EPA
CEO pollution exposure	Monitor-specific geometric means of annual TSP index for the county scaled by thousand where CEOs achieve the bachelor's degree (/1000)	EPA and Compustat
Loan characteristics		
Spread	Loan facility spread scaled by 100, referred as "AllinDrawn" in the database	DealScan
Secured	Dummy variable equal to 1 if the loan facility requires collateral	DealScan
Financial Covenant	Dummy variable equal to 1 if the loan facility requires financial covenants	DealScan
Financial Covenant Intensity	The number of financial covenants required in each loan facility	DealScan
Facility Amount(million)	The actual amount of the facility committed by the facility's lender pool.	DealScan
Ln (Facility Amount)	The natural logarithm of facility amount	DealScan
Maturity	The length (in months) the facility will be active from signing date to expiration date	DealScan
Ln (Maturity)	The natural logarithm of loan facility maturity	DealScan
Sole lender	Dummy equal to 1 if there is only one facility lender	DealScan
Borrower characteristics		
Borrower size(million)	The natural logarithm of borrower company's total asset measured in million	Compustat
Borrower current ratio	Current assets divided by current liabilities	Compustat
Borrower tangibility	Property, Plant and Equipment (PPE) divided by total assets	Compustat
Borrower ROA	Earnings before interest and taxes (EBIT) divided by book value of total assets	Compustat
Borrower leverage ratio	Book value of liabilities divided by book value of total assets	Compustat
Borrower Z-score	Z-score is computed as (1.2*working capital + 1.4*retained earnings + 3.3*EBIT + 0.999*sales)/total assets	Compustat
Lender characteristics		
Lender size(thousand)	The natural logarithm of lender's total asset measured in thousand (BHCK2170)	Y-9C
Lender ROA	Bank's EBIT (BHCK4300) over asset (BHCK2170)	Y-9C
Lender leverage	Total liability (BHCK2948) scaled by total asset	Y-9C
Lending	Total lending (BHCK2122) scaled by total asset	Y-9C
Deposit	Total deposit (BHDM6631+BHDM6636+BHFN6631+BHFN6636) scaled by total asset	Y-9C
Tier-1 capital	Lender's tier-1 capital (BHCK8274) scaled by Total asset	Y-9C
Tail risk	The average return for a bank during the 5% worst (best) return days for the bank in a year	CRSP
Marginal expected shortfall	The average return for a bank during the 5% worst (best) return days for the overall stock market in a year	CRSP
Loan interest income	Bank's Total interest income (BHCK4107) scaled by Total lending (BHCK2122)	Y-9C
CEO characteristics		
Age	the age when the facility is initiated	Execucomp
Tenure length	The number of years the CEO has served when the facility is initiated	BoardEx
MBA	Dummy equal to 1 if the CEO holds an MBA degree	BoardEx
IvyLeague	Dummy equal to 1 if the CEO has an Ivy League education	BoardEx
CEO/Chair Duality	Dummy equal to 1 if the CEO also serves as the Chairman of the Board	BoardEx

CEO overconfidence	Dummy equal to 1 if the CEO holds stock options that are more than 100% in the money for the first time.	Execucomp
Bank governance		
Board size	The number of directors sitting on the board	RiskMetrics
Board independence	the fraction of nonexecutive directors on the board	RiskMetrics
Bank local characteristics		
Ln(population)	The natural logarithm of county's population	US Census Bureau
Ln(income)	The natural logarithm of county's annual income per capita	US Census Bureau
NPOs	The number of tax-exempt non-profit organizations scaled by population	NRCRD
Social organizations	The number of social organizations (including religious organizations, civic organizations, business associations, political organizations, labour organizations, bowling centres, physical fitness facilities, public golf courses, and sport clubs) divided by the total population	NRCRD
Others		
Fraction of lending volume	The fraction of each industry's total lending received from a particular lender during one year to the lender's total facility lending in the same period	DealScan
Listed industry	Dummy equals 1 if the industry is in the EPA TRI program mandatory list	EPA

Table1: Summary Statistics

This table reports summary statistics for all the variables used in our research as defined in Appendix 1.

	count	Mean	sd	min	max	p1	p50	p99
$Emission_{firm}$	5,803	0.239	1.599	0.000	43.232	0.000	0.000	5.794
CEO Pollution $Exposure_{Bank}$	5,841	0.114	0.082	0.025	0.292	0.042	0.061	0.283
Loan characteristics								
Spread	5,533	181.080	132.146	1.750	1400.000	15.000	150.000	650.000
Secured	5,841	0.425	0.494	0.000	1.000	0.000	0.000	1.000
Financial Covenant	5,841	0.539	0.498	0.000	1.000	0.000	1.000	1.000
Financial Covenant Intensity	3,150	2.073	0.905	1.000	6.000	1.000	2.000	5.000
Facility Amount	5,841	625.338	1158.070	0.150	17200.000	3.000	250.000	5500.00
Ln (Facility Amount)	5,841	19.220	1.600	11.920	23.570	14.914	19.337	22.428
Maturity	5,734	48.808	21.401	1.000	180.000	6.000	60.000	90.000
Ln (Maturity)	5,734	3.728	0.661	0.000	5.193	1.792	4.094	4.500
Sole lender	5,734	0.095	0.293	0.000	1.000	0.000	0.000	1.000
Bank governance characteristics								
Board size	4,839	14.614	3.049	8	29	11	14	24
Board independence	4,839	0.810	0.109	0.333	0.941	0.500	0.833	0.938
Borrower characteristics								
$Size(million)_{firm}$	5,803	7.875	1.850	1.553	13.709	3.742	7.869	12.397
$Current\ ratio_{firm}$	5,625	1.941	1.272	0.000	38.685	0.450	1.711	5.515
$Tangibility_{firm}$	5,800	0.309	0.195	0.000	1.000	0.032	0.259	0.815
ROA_{firm}	5,795	0.095	0.074	-0.522	0.564	-0.099	0.089	0.309
$Leverage\ ratio_{firm}$	5,800	0.658	0.250	0.017	3.189	0.170	0.641	1.484
$Z\text{-}score_{firm}$	5,392	1.852	1.026	-3.472	10.353	-0.539	1.834	4.529
CEO characteristics								
Age	5,631	56.015	4.206	40.000	70.000	45.000	56.000	70.000
Tenure length	5,818	5.671	3.712	0.000	25.000	1.000	5.000	17.000
MBA	5,841	0.505	0.500	0.000	1.000	0.000	1.000	1.000
IvyLeague	5,841	0.568	0.495	0.000	1.000	0.000	1.000	1.000
CEO/Chair Duality	5,841	0.813	0.390	0.000	1.000	0.000	1.000	1.000
CEO overconfidence	4,509	0.453	0.498	0.000	1.000	0.000	0.000	1.000
Bank local characteristics								
Ln(population)	5,691	13.566	1.332	8.287	16.088	8.287	13.905	16.035
Ln(income)	5,692	10.808	0.552	9.794	12.078	9.835	10.684	12.078
NPOs	5,839	7.958	3.447	1.237	13.409	2.213	6.857	13.409
Social organizations	5,839	1.046	0.176	0.435	1.515	0.657	1.042	1.363
Industry Average Borrower characteristics								
Fraction of lending	7,716	0.065	0.142	0.000	1.000	0.000	0.019	1.000
Average size	7,663	7.292	2.167	-0.146	14.751	2.392	7.269	12.762

Average ROA	7,651	0.064	0.595	-49.604	1.581	-0.353	0.078	0.314
Average current ratio	6,851	1.952	1.612	0.000	41.371	0.344	1.680	6.510
Average tangibility	7,551	0.294	0.228	0.000	1.000	0.001	0.235	0.872
Average leverage ratio	7,658	0.712	3.264	-0.061	280.303	0.159	0.640	1.591
Average Z-score	6,703	0.451	75.624	-5600.102	20.220	-3.967	1.765	4.953
Bank characteristics								
Lender size(thousand)	993	16.928	2.018	11.999	21.687	12.868	16.730	18.323
Lender ROA	993	0.009	0.010	-0.162	0.037	-0.024	0.010	0.013
Lender leverage	993	0.901	0.032	0.619	0.965	0.784	0.906	0.922
Lending	993	0.608	0.159	0.027	0.897	0.060	0.646	0.707
Deposit	993	0.703	0.141	0.042	0.927	0.128	0.729	0.796
Tier-1 capital	740	0.083	0.024	0.038	0.320	0.046	0.079	0.091
Tail risk	1016	-0.047	0.028	-0.194	0.010	-0.163	-0.039	-0.030
Marginal expected shortfall	1016	-0.031	0.016	-0.104	0.010	-0.086	-0.027	-0.021
Loan interest income	993	0.090	0.055	0.035	0.534	0.038	0.081	0.103

Table 2： CEO Pollution Exposure and Commercial Loan Facility Cost

The table reports the regression results for the impact of CEO's pollution exposure on the commercial loan spread. The unit of observations is facility level. The dependent variable is commercial loan facility cost proxied by *Spread*. The main explanatory variables of interest are the *Borrower emission*, *CEO pollution exposure* and the interaction term *Borrower emission*CEO pollution exposure*. Columns (1)-(3) show the effect of CEO pollution exposure on the loan facility spread. Standard errors are clustered at the bank level. Please refer to Appendix 1 for the definitions of all variables. T-statistics are reported in parentheses. ***, ** and * indicate significance at a two-sided 1%, 5% and 10% level, respectively.

DV: Spread	(1)	(2)	(3)
$Emission_{firm}$	0.056***	0.052***	0.053**
	(2.990)	(2.910)	(2.287)
$Emission_{firm}$×CEO Pollution $Exposure_{Bank}$	-0.317***	-0.287***	-0.371***
	(-3.138)	(-2.811)	(-3.176)
CEO Pollution $Exposure_{Bank}$	-0.125	-0.214	0.066
	(-0.451)	(-0.862)	(0.235)
Ln (Facility Amount)	-0.178***	-0.177***	-0.161***
	(-4.844)	(-4.708)	(-5.317)
Ln (Maturity)	0.022	0.019	-0.004
	(0.509)	(0.470)	(-0.092)
Secured	0.668***	0.614***	0.571***
	(10.07)	(9.351)	(9.427)
Financial Covenant	-0.202***	-0.207***	-0.172***
	(-5.742)	(-5.746)	(-5.964)
Sole lender	0.072	0.095	0.055
	(1.135)	(1.505)	(0.826)
$Size_{firm}$	-0.070**	-0.017	-0.028
	(-2.685)	(-0.618)	(-1.154)
Current $ratio_{firm}$	-0.006	-0.015	-0.015
	(-0.499)	(-1.249)	(-1.267)
$Tangibility_{firm}$	-0.130	-0.192	-0.082
	(-0.990)	(-1.539)	(-0.700)
ROA_{firm}	-2.369***	-2.241***	-2.143***
	(-11.150)	(-12.190)	(-12.61)
Leverage $ratio_{firm}$	0.780***	0.665***	0.621***
	(7.325)	(6.298)	(5.966)
Z-$score_{firm}$	-0.071***	-0.045**	-0.051***
	(-3.418)	(-2.523)	(-3.365)
Year FE	Y	Y	Y
Loan Type & Purpose FE	Y	Y	Y
Industry FE	Y	Y	Y
State FE	Y	Y	Y
Credit $Rating_{firm}$ FE		Y	Y
Lender FE			Y
Observations	5,039	5,039	5,039
R-squared	0.598	0.610	0.629

Table 3： Robustness Checks- Alternative measures

This table reports regression results for alternative *CEO pollution exposure* and *Borrower emission measures*. *Ln(CEO pollution exposure)* is alternatively defined as the natural logarithm of originally average TSP index (Column (1)), the average of 95th TSP values for each county (Column (2)) and the average of 99th TSP values for each county (Column (3)). In column (4), the original total chemical emission is divided by borrower's sales. Standard errors are clustered at the bank level. Please refer to Appendix 1 for the definitions of all variables. T-statistics are reported in parentheses. ***, ** and * indicate significance at a two-sided 1%, 5% and 10% level, respectively.

DV: *Spread*	(1)	(2)	(3)	(4)
	Ln (CEO pollution exposure)	Dummy =1 if CEO pollution >75th	Dummy =1 if CEO pollution >90th	Total chemical emission scaled by sales
$Emission_{firm}$	0.218**	0.045**	0.044**	0.118**
	(2.639)	(2.055)	(2.430)	(2.354)
$Emission_{firm}$ × CEO Pollution $Exposure_{Bank}$	-0.045***	-0.309***	-0.166***	-0.025**
	(-2.838)	(-2.958)	(-2.805)	(-2.462)
CEO Pollution $Exposure_{Bank}$	0.012	0.017	-0.039	-0.005
	(0.314)	(0.076)	(-0.235)	(-0.018)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Loan Type FE and Loan Purpose FE	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y
State FE	Y	Y	Y	Y
Credit $Rating_{firm}$ FE	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y
Observations	5,039	5,039	5,039	5,034
R-squared	0.628	0.629	0.642	0.628

Table 4： Robustness Checks for Additional Controls

This table reports various robustness tests on the baseline that addressing the potential omitted variables. Panel A controls CEO other characteristics, Panel B controls bank governance and Panel C controls bank local characteristics. Standard errors are clustered at the bank level. Please refer to Appendix 1 for the definitions of all variables. T-statistics are reported in parentheses. ***, ** and * indicate significance at a two-sided 1%, 5% and 10% level, respectively.

Panel A: Additional Controls for CEO characteristics

DV: *Spread*	(1)	(2)	(3)	(4)	(5)	(6)
$Emission_{firm}$	0.064**	0.086	0.099	0.097	0.081	0.227
	(2.152)	(0.576)	(0.658)	(0.647)	(0.641)	(0.893)
$Emission_{firm}$ × CEO Pollution $Exposure_{Bank}$	-0.382***	-0.393***	-0.348**	-0.347**	-0.349**	-0.577**
	(-3.406)	(-3.199)	(-2.520)	(-2.127)	(-2.127)	(-2.533)
CEO Pollution $Exposure_{Bank}$	0.181	0.169	0.119	0.212	0.262	-0.835
	(0.782)	(0.777)	(0.515)	(0.482)	(0.530)	(-1.137)
$Emission_{firm}$ ×CEO Tenure	-0.002	-0.002	-0.001	-0.001	-0.001	0.003
	(-0.683)	(-0.756)	(-0.424)	(-0.303)	(-0.305)	(0.617)
CEO Tenure	-0.005	-0.002	-0.003	-0.003	-0.004	-0.006
	(-0.802)	(-0.149)	(-0.228)	(-0.216)	(-0.273)	(-0.644)
$Emission_{firm}$ ×CEO Age		-0.000	-0.001	-0.001	-0.001	-0.003
		(-0.125)	(-0.340)	(-0.334)	(-0.484)	(-0.624)
CEO Age		-0.001	-0.001	-0.000	-0.000	-0.002
		(-0.187)	(-0.084)	(-0.063)	(-0.046)	(-0.211)
$Emission_{firm}$ ×CEO MBA			0.022	0.022	0.022	-0.029
			(1.398)	(0.770)	(0.772)	(-0.742)
CEO MBA			0.080	0.071	0.079	0.115
			(1.218)	(0.789)	(0.915)	(1.075)
$Emission_{firm}$ ×CEO IvyLeague				0.001	0.006	-0.053
				(0.0225)	(0.124)	(-0.974)
CEO IvyLeague				0.028	0.036	-0.060
				(0.259)	(0.309)	(-1.172)
$Emission_{firm}$ ×CEO/Chair Duality					0.042	0.023
					(1.306)	(0.733)
CEO/Chair Duality					0.022	-0.037
					(0.371)	(-0.813)
$Emission_{firm}$ × CEO Overconfidence						0.025
						(1.254)
CEO overconfidence						0.254*
						(1.877)
Control variables	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Loan Type FE and Loan Purpose FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Credit $Rating_{firm}$ FE	Y	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y	Y
Observations	5,011	4,841	4,827	4,827	4,827	3,699
R-squared	0.628	0.616	0.621	0.621	0.621	0.622

Panel B: Control for bank governance

DV: *Spread*	(1)	(2)
Borrower emission	0.107*	0.428**
	(1.901)	(2.080)
$Emission_{firm}$ × $CEO\ Pollution\ Exposure_{Bank}$	-0.258**	-0.263**
	(-2.217)	(-2.154)
$CEO\ Pollution\ Exposure_{Bank}$	-0.323	-0.351
	(-1.370)	(-1.534)
$Emission_{firm}$ ×Board size	-0.004	-0.00987
	(-1.175)	(-1.688)
Board size	-0.019**	-0.0173**
	(-2.723)	(-2.493)
$Emission_{firm}$ ×Board independence		-0.306*
		(-1.869)
Board independence		0.0738
		(0.301)
Control variables	Y	Y
Year FE	Y	Y
Loan Type FE and Loan Purpose FE	Y	Y
Industry FE	Y	Y
State FE	Y	Y
$Credit\ Rating_{firm}$ FE	Y	Y
Lender FE	Y	Y
Observations	4,172	4,172
R-squared	0.602	0.603

Panel C: Control for bank local characteristics

DV: *Spread*	(1)	(2)	(3)	(4)
$Emission_{firm}$	0.288*	0.905*	1.099**	1.026*
	(1.972)	(1.897)	(2.321)	(1.873)
$Emission_{firm}$ × CEO Pollution $Exposure_{Bank}$	-0.412***	-0.498***	-0.538***	-0.555***
	(-4.946)	(-4.034)	(-3.957)	(-4.424)
CEO Pollution $Exposure_{Bank}$	0.007	0.088	0.147	0.056
	(0.0266)	(0.278)	(0.390)	(0.130)
$Emission_{firm}$ ×Ln(population)	-0.017	-0.014	-0.019*	-0.019**
	(-1.510)	(-1.283)	(-2.003)	(-2.185)
Ln(population)	-0.002	-0.001	0.001	0.002
	(-0.141)	(-0.122)	(0.104)	(0.148)
$Emission_{firm}$ ×Ln(income)		-0.061	-0.069*	-0.066
		(-1.557)	(-1.886)	(-1.635)
Ln(income)		-0.032	-0.025	-0.025
		(-0.503)	(-0.472)	(-0.470)
$Emission_{firm}$ ×NPOs			0.0024	0.262
			(0.565)	(0.417)
NPOs			-0.007	0.001
			(-0.0936)	(0.018)
$Emission_{firm}$ ×Social organizations				0.050
				(0.567)
Social organizations				0.001
				(0.092)
Control variables	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Loan Type FE and Loan Purpose FE	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y
State FE	Y	Y	Y	Y
Credit $Rating_{firm}$ FE	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y
Observations	4,896	4,896	4,896	4,896
R-squared	0.628	0.628	0.629	0.629

Table 5： Identification Check for the Rise of Green Finance Concern

This table presents the dynamic effect of CEO pollution exposure on commercial loan cost. We define the year 2014, when the US Clean Power Plan was proposed, as the event breakpoint and take three years before and after the year as the observations. *Post* is a dummy that takes 1 for facilities approved during 2015-2017. The dependent variable is the *Spread* of loan facility. Standard errors are clustered at the bank level. Please refer to Appendix 1 for the definitions of all variables. T-statistics are reported in parentheses. ***, ** and * indicate significance at a two-sided 1%, 5% and 10% level, respectively.

DV: *Spread*	(1)	(2)	(3)
$Emission_{firm}$	0.726***	0.852***	0.770***
	(3.824)	(5.425)	(4.758)
$Emission_{firm}$ × CEO Pollution $Exposure_{Bank}$	-13.570***	-14.520***	-13.030***
	(-4.700)	(-4.900)	(-4.590)
CEO Pollution $Exposure_{Bank}$	-1.850	-1.425	3.070***
	(-0.550)	(-0.453)	(3.397)
$Emission_{firm}$ ×Post2014	-0.959***	-1.056***	-0.817***
	(-3.260)	(-5.066)	(-4.478)
CEO Pollution $Exposure_{Bank}$ ×Post2014	5.054	5.401	2.263
	(1.181)	(1.351)	(0.430)
$Emission_{firm}$ × CEO Pollution $Exposure_{Bank}$ ×Post2014	16.040***	17.070***	12.460***
	(2.953)	(4.288)	(3.698)
Control Variables	Y	Y	Y
Year FE	Y	Y	Y
Loan Type FE and Loan Purpose FE	Y	Y	Y
Industry FE	Y	Y	Y
State FE	Y	Y	Y
Credit $Rating_{firm}$ FE		Y	Y
Lender FE			Y
Observations	1,474	1,474	1,474
R-squared	0.492	0.536	0.569

Table 6: CEO Pollution Exposure and Loan Non-price Contractual Terms

This table presents the results of the impact from CEO pollution exposure experience on non-price contractual terms. The dependent variables are dummy of *Financial Covenant* in Column (1), number of total financial covenants in Column (2), the natural logarithm of loan facility amount in (3), the natural logarithm of loan facility in months in (4) and dummy of requirement for collateral in Column (5). The main explanatory variables of interest are the *Borrower emission*，*CEO pollution exposure* and the interaction *Borrower emission*CEO pollution exposure*. Standard errors are clustered at the bank level. Please refer to Appendix 1 for the definitions of all variables. T-statistics are reported in parentheses. ***, ** and * indicate significance at a two-sided 1%, 5% and 10% level, respectively.

Dependent Variable	(1) Financial Covenant	(2) Financial Covenant Intensity	(3) Ln (Facility Amount)	(4) Ln (Maturity)	(5) Secured
$Emission_{firm}$	-0.019*	-0.001	-0.012	0.025***	-0.015
	(-1.932)	(-0.037)	(-0.422)	(3.815)	(-1.681)
$Emission_{firm}$×CEO Pollution $Exposure_{Bank}$	1.036	0.536	-0.885	-1.178**	1.588***
	(1.667)	(0.647)	(-0.713)	(-2.401)	(3.718)
CEO Pollution $Exposure_{Bank}$	0.179	-10.720***	-12.080***	-4.168***	5.037***
	(0.205)	(-7.781)	(-9.074)	(-4.673)	(12.13)
Control Variables	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Loan Type & Loan Purpose FE	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y
Credit $Rating_{firm}$ FE	Y	Y	Y	Y	Y
Observations	5,039	2,859	5,039	5,039	5,039
R-squared	0.311	0.446	0.645	0.508	0.537

Table 7: CEO Pollution Exposure and Credit Allocation between Green vs. Non-green Industries

This table examines the impact of CEO's pollution exposure on the credit allocation among green and non-green industries. The unit of observations is the bank-industry-year. The dependent variable is fraction of lending volume as defined in the Appendix. The main explanatory variables of interest are the *Listed industry*，*CEO pollution exposure* and their interaction *Listed industry *CEO pollution exposure*. The dummy *Listed industry* takes 1 if the industry is in the EPA TRI program mandatory list. Standard errors are clustered at the bank level. Please refer to Appendix 1 for the definitions of all variables. T-statistics are reported in parentheses. ***, ** and * indicate significance at a two-sided 1%, 5% and 10% level, respectively.

DV: fraction of lending volume	(1)	(2)
Listed industry	-0.016***	-
	(-3.238)	-
Listed industry×CEO Pollution Exposure$_{Bank}$	0.107**	0.101**
	(2.599)	(2.568)
CEO pollution exposure$_{Bank}$	0.055	-0.051
	(0.816)	(-1.203)
Industry average size	0.0079***	0.011***
	(3.160)	(5.055)
Industry average current ratio	0.055	0.037
	(1.506)	(1.286)
Industry average ROA	0.002	0.003
	(0.757)	(1.226)
Industry average tangibility	0.007	0.015
	(0.655)	(0.761)
Industry average leverage ratio	0.005	0.011
	(0.482)	(0.754)
Industry average Z-score	-0.005***	-0.002
	(-3.812)	(-0.637)
Year FE	Y	Y
Industry FE		Y
Lender FE	Y	Y
Observations	6,694	6,412
R-squared	0.350	0.490

Table 8: CEO Pollution Exposure and Bank Risk-Taking and Loan Profitability

This table presents the results of the impact from CEO pollution exposure experience on the bank's risk management. The unit of observation is bank-year. The dependent variables are *Tail Risk, Marginal Expected Shortfall, ROA* and *Loan profitability*, respectively. The main explanatory variable of interest is the *CEO pollution exposure*. Standard errors are clustered at the bank level. Please refer to Appendix 1 for the definitions of all variables. T-statistics are reported in parentheses. ***, ** and * indicate significance at a two-sided 1%, 5% and 10% level, respectively.

Dependent Variable	(1) Tail Risk	(2) Marginal Expected Shortfall	(3) ROA	(4) Loan Profitability
CEO Pollution Exposure$_{Bank}$	-0.085**	-0.024**	0.004	0.056*
	(-2.435)	(-2.315)	(0.202)	(1.728)
ROA$_{Bank}$	0.864***	0.209***		0.144
	(5.580)	(4.599)		(0.833)
Size$_{Bank}$	-0.000	-0.000	-0.001	0.002
	(-0.0653)	(-0.306)	(-1.493)	(0.602)
Leverage$_{Bank}$	0.064	0.017	-0.030	0.135**
	(1.507)	(1.219)	(-1.113)	(2.278)
Lending$_{Bank}$	0.020	0.006	-0.009	-0.095***
	(1.227)	(1.249)	(-1.408)	(-6.691)
Deposit$_{Bank}$	-0.033*	-0.014**	-0.016**	-0.005
	(-1.680)	(-2.266)	(-2.438)	(-0.260)
Tier-1 capital$_{Bank}$	-0.145*	-0.039	0.034	0.258**
	(-1.874)	(-1.429)	(0.948)	(2.556)
Lender FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	725	725	737	737
R-squared	0.794	0.903	0.794	0.903