Do banks price environmental risk? Only when local beliefs are binding!

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Abstract

What is the impact on the cost of bank credit of local corporate environmental and biodiversity exposure? At loan origination banks charge higher rates to firms creating more environmental damage, especially when they are lowly capitalized, and when the firms operate in "greener" states with lower climate denial and there is more negative environmental news. Biodiversity risk is also priced, especially when public interest in it intensifies. Following the Trump withdrawal from Paris, banks modulate their environmental risk pricing in "browner" states. In sum, environmental risk pricing in bank lending is also driven by local beliefs and attitudes.

Key words: Climate change, biodiversity risk, bank credit, personal beliefs.

JEL classification: G12, G18, G21

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1 Introduction

The last decade has seen an increasing awareness in environmental sustainability including biodiversity. Environmental concerns have also taken center stage among both academics and policymakers. Almost two hundred countries have to date signed the Paris Agreement and committed themselves to reaching the net zero targets. The severity and vulnerability of environmental damage however remains subject to a heated debate. Climate change "believers" and "deniers" assess the health of the Earth‘s ecosystems very differently and thereby support vastly different courses of regulatory action. In the March 2023 Gallup Survey, for example, only 39% of Americans believe that global warming poses a threat to their way of life; on the other hand, already 62% of Americans believe that global warming is caused by emissions related to human activities[1]. And in June 2017, U.S. president Trump even called global warming a “hoax” when announcing the withdrawal of the United States from the Paris Agreement. Yet in 2020, Biden based his successful presidential campaign on environmental sustainability and reversed the withdrawal from the Paris Agreement on the first day of his presidency.

Given all this widespread disagreement on causes and differences in actions on the environment, how can and do banks actually reflect environmental harm in their lending decisions, and thereby reconcile these diverse perspectives? And are environmental damage concerns driven by or complements to biodiversity risk?

To answer these questions in this paper, we investigate whether and how banks price the environmental footprint of and potential harm caused by their borrowers. We rely on a sample of U.S. syndicated loans during the period 2004-2019.[2] We establish salient stylized empirical facts on the sensitivity of the loan rates to the direct and indirect environmental impact of the borrowers. We examine biodiversity risk as a specific source of environmental risk.

We start by documenting that banks charge higher loan rates to those borrowers that have a higher impact and inflict more damage on the environment, including water, air, land, and natural resource

[1] https://news.gallup.com/poll/474542/steady-six-say-global-warming-effects-begun.aspx

[2] We cut our investigation when COVID-19 and public health responses fundamentally (though temporarily) disrupted regular financial-economic and bank lending activities.

use, and waste. In particular, we establish that the same lender in the same year, after controlling for borrower and non-price deal characteristics, charges a 0.9 percentage points (pp) higher rate relative to the mean to borrowers with a one-standard-deviation higher level of total impact on the environment.

Then we also exploit the heterogeneity of these effects across the lenders, and document the sensitivity to be greater among the banks with lower capitalization, suggesting that lowly capitalized banks perceive the environmental damage of their borrowers as an additional source of risk. This effect is robust to controlling for both borrower characteristics and other loan term features, including but not limited to the loan size, loan maturity, and/or the type of the loan (*i.e.*, the presence of covenants and collateral, and non-bank participation).

To investigate what drives this pricing of the environmental footprint, we focus on the role of personal beliefs and preferences in the locale of the borrower. Using the Yale Survey of Climate Change beliefs, we classify states as "green" or "brown" and we document that lenders penalize firms for their environmental impact only in green states, where the public based on their personal experiences shows a high level of awareness of global warming. This suggests that the environmental risk perception is related to the beliefs and preferences in the local area of the borrowers. We also test whether banks are more likely to penalize borrowers for environmental damage in the locales where the public believes that global warming will harm them personally. We document that the loan-environmental impact sensitivity only arises in the areas where climate change denial is low. These results suggest that banks consider the personal beliefs in the local areas of their borrowers and especially whether the public may perceive global warming as a personal threat.

One identification challenge is that lenders may penalize borrowers for their environmental impact not only because they are seen as riskier, but also because lenders are environmentally conscious and have an ESG-driven and socially responsible business model. Thus, the price penalty in the brown relative to the green assets can be conceptually decomposed into a taste and a risk premium as in recent theoretical frameworks (Pástor et al. (2021)). We thus analyze the sensitivity of the loan prices to the environmental impact of the borrowers with a lender $\times$ year fixed effects (FE), looking at the

cross-section of loan rates across the borrowers with different levels of environmental impact for the same lender and in the same year, insulating our effects from the business model and attitudes of the bank.

In addition, we exploit a number of exogenous shocks to personal beliefs. We find that banks become more likely to price environmental risk when there are negative climate news. We use local abnormal temperatures and find that banks are more likely to price the environmental footprint of their borrowers at times of abnormal temperatures. For the average U.S. global warming rate, a one standard deviation increase in environmental impact results in a 32 basis points (bps) additional spread penalty. We use abnormal temperatures to understand the source of the lender's price penalty and we consider regulatory and physical risk as a source of local beliefs. We isolate regulatory risk, as measured by the Democratic-Republican vote share gap in the state senate, as the key channel that drives the price response of the lenders to the unexpected environmental concerns in the local state of their borrowers.

We then study biodiversity risk as a specific source of environmental risk. It may be the case that the environmental footprint of the borrowers is priced due to related biodiversity risk considerations. To do so, we use the firm-level 10-K and regional biodiversity risk measures in Giglio et al. (2023). We acknowledge the possibility that banks may penalize borrowers for their environmental damage due to their biodiversity risk concerns. For example, the harm that a borrowing firm creates for the environment can be irreversible and may lead some species at a high risk of extinction to disappear. Thus, we explore the regional (and also firm-level) dispersion in the biodiversity risk exposures. Using a variety of measures, we find that the biodiversity risk exposure of firms is unlikely to explain why banks demand compensation for the environmental damage and harm of their borrowers. Remarkably, we empirically observe that there exists little correlation between the environmental harm and the biodiversity risk exposures of the firms.

However, we instead uncover novel evidence that biodiversity risk is also priced and it has an impact on the cost of bank credit. Especially negative 10-K news of biodiversity has an important

impact whereas other variables such as 10-K mentions with respect to biodiversity issues and regulatory developments are insignificant. These results suggest that banks especially price negative biodiversity news rather than merely their relevance at loan origination. When we investigate the industry-based measures of biodiversity risk and do not find that they play a role for the cost of bank credit. The species extinction risks however are very strongly priced. We find that a 1% increase in the share of endangered species in the state of the borrower increases the loan rates by 2.37 pp relative to the mean (88.69×0.06 / 224). If firms are in the states where local biodiversity is at a high risk of extinction, lenders demand higher compensation for that risk exposure. The results suggest that environmental harm and biodiversity risk are perceived by banks as separate risk factors.

We also examine salience in the pricing of biodiversity risk. More specifically, we look at whether lenders consider the interests and concerns of the local public in biodiversity risks and issues. Using the Google attention index, we find that across most measures of biodiversity risk, lenders become more likely to demand compensation for biodiversity risk exposure at times when the public is more likely to show interest in biodiversity issues.

We finally study the surprise withdrawal of Trump from the Paris Agreement which represented an idiosyncratic reversal of commitment from the net-zero targets. Our setup gives us a distinction between the firms that are affected and unaffected by the deregulation, as a series of states and cities immediately sued the Trump administration in Court to vacate the withdrawal. We also expect the borrowers in the states with a Republican majority that have a political mindset similar to the Trump government to be more affected as they were unlikely to challenge the government *ex post*. Similarly, our conjecture is that banks are more likely to relax their sensitivity to environmental damage if environmental denial in the local area is low.

We find that the environmental deregulation led banks to reduce the sensitivity of their loan pricing to the environmental footprint of the borrowers in the areas that did not sue the Trump government and in the Republican states. To gain deeper insights, we study the role of beliefs and find that the reduction in the price sensitivity to the environmental impact is stronger in the states not prone to

climate denial, suggesting that local beliefs are reflected in the response of the cost of bank credit to environmental deregulation. Our results suggest that lenders are more likely to demand compensation for environmental risk if they anticipate higher social pressure and regulatory enforcement. We again control the time-varying changes in the green attitudes and preferences of the banks themselves (by including lender × year fixed effects in all our specifications). Moreover, we find that the pricing effects appear only in the types of environmental impact covered by the deregulatory initiatives of the Trump government, such as the land and water impact, air pollution, and GHG emissions. Overall, our results suggest that the environmental deregulation led banks to relax their environmental sensitivity in the cost of bank loans, but only if the local beliefs and attitudes are likely to be supportive.

We aim to make a contribution to four distinct strands of the literature. First, we contribute to the literature on the implications of the environmental impact of firms on the cost of financing. Several papers show that investors require a premium for holding the stock of firms with high levels of carbon emissions (Bolton and Kacperczyk (2021a)[3] and Bolton and Kacperczyk (2021b)[4]). A nascent and growing literature also investigates the impact of climate change on bank lending and has found evidence of pricing effects (Degryse et al. (2023) and Delis et al. (2024)). Giannetti et al. (2023) document with confidential data that there is a discrepancy between the bank disclosures and their green lending and that banks are reluctant to sever ties with brown borrowers in financial difficulties. However, there has been relatively little effort to understand what drives banks to price environmental risks in the cost of bank credit. Our contribution to this literature is two-fold. Rather than focusing on the carbon emissions, we consider the overall and different types of environmental impact and damage on the loan rates. And, we investigate what drives the loan pricing behavior of banks and our focus is on the role of local personal beliefs and attitudes.

[3]Bolton and Kacperczyk (2021a) for example document a carbon premium in the cross-section of U.S. stock returns, and show that stocks of firms with higher emissions earn higher returns, controlling for size, book-to-market, and other return predictors. The carbon premium is not explained by known risk factors, suggesting that investors demand compensation for exposure to carbon emission risk.

[4]Bolton and Kacperczyk (2021b) also find that the carbon premium is global and captures the carbon transition risk. They show that the short-term transition risk is greater in the countries with greater reliance on fossil energy and lower economic development whereas the long-term transition risk is higher in the countries with stricter domestic climate policies.

The second strand of literature we aim to contribute to is a new literature on biodiversity. Biodiversity risk has received surprisingly little attention in the finance literature so far. Our paper is the first study that looks at the impact of biodiversity risk on the loan prices. We find evidence that banks consider the biodiversity risk exposure of their borrowers in their lending decisions. We also show that biodiversity risk is perceived as a separate risk factor rather than a substitute for environmental harm.

With a conceptual framework on financing biodiversity, Flammer et al. (2023) argue that biodiversity can be financed with pure private capital and blended financing structures in which private capital is blended with public and philanthropic capital to de-risk the private capital investments. Using deal-level data from a leading biodiversity finance institution, they show that projects with higher expected returns tend to be financed by pure private capital while larger-scale projects tend to attract blended financing. A group of recent working papers empirically study whether biodiversity is a priced risk factor. Giglio et al. (2023) construct news-based measures of the U.S. firms' biodiversity risk using the disclosure of biodiversity issues in the 10-K filings. They document that exposures to biodiversity risk significantly differ across industries and affect equity prices as portfolios sorted on biodiversity risk exposure co-varies positively with innovations in aggregate biodiversity risk. Garel et al. (2023) conduct this study for a global sample, and they document that in the aftermath of the Kunming Declaration, investors started to require compensation for firms with a high biodiversity footprint. The topic has however not been studied in the corporate loan market yet.

Thirdly, we also relate to the literature concerned with the effects of heterogeneous beliefs on the pricing behavior. The empirical literature in this area has focused on the role of beliefs for the development of housing prices. Baldauf et al. (2020) for example use transactional data on housing prices and future inundation forecasts, and document that houses projected to be underwater sell at a discount compared to houses in the denier neighborhoods. They also use the Yale Climate Opinion survey for data on climate beliefs. The role of beliefs has however attracted surprisingly little attention in the banking literature. We provide novel evidence that the heterogeneity of beliefs is reflected in the impact of environmental risk on the cost of bank credit. We also show that belief differences

concerning climate change affect the implications of environmental deregulation, suggesting that banks consider local beliefs and preferences as the underlying source of environmental risk. Dursun-de Neef and Ongena (2023) provide complementary evidence on the deposit-side and show with branch-level deposit data from the United States that depositors move their money away from fossil-fuel-financing banks when experiencing warmer-than-usual temperatures.

Fourth and finally, we add to a growing literature that studies the role of bank regulation on climate finance. Kacperczyk and Peydró (2022) show that banks that committed to carbon neutrality reduced their credit to firms with higher carbon emissions. Delis et al. (2024) find that after the Paris Agreement, banks started to charge higher rates to brown firms with larger fossil fuel reserves. Degryse et al. (2023) document that after the Paris Agreement, banks rewarded firms that voluntarily disclose their carbon emissions to the Carbon Disclosure Project (CDP) in the form of cheaper loans. A related line of work investigates the impact of the cap-and-trade policies. Antoniou et al. (2020) find that the 2013 EU Emissions Trading System led banks to reduce their loan spreads, driven by the expected reduction in carbon emissions. Using the discontinuities in the California cap-and-trade program, Ivanov et al. (2023) show that high emission firms face higher interest rates and that the effects are concentrated among private firms [5]. The novelty of our paper is our focus on environmental deregulation. We provide salient evidence that the surprise withdrawal of Trump from the Paris agreement in the U.S. has reduced the sensitivity of the loan prices to the environmental damage of the borrowers. The effects only operate in the non-challenger and non-denier states, consistent with our interpretation that local enforcement and beliefs affect environmental risk perceptions.

We structure the remainder of our paper as follows. We describe the data in Section 2 and present the empirical design in Section 3. We report the results in Section 4 and conclude in Section 6.

[5]Bartram et al. (2022) provide evidence of geographic arbitrage using U.S. plant-level data. They find that in response to the California- cap-and-trade program, financially constrained firms shifted emissions and output to states with under-utilized plants while not reducing the overall level of their total emissions.

2 Data

We extract our data from the London Stock Exchange Group (LSEG) Dealscan Database where each observation corresponds to a facility loan agreement in the syndicated loans provided to the U.S. firms. Syndicated lending is characterized by the presence of multiple lenders: one or multiple lead arrangers that screen and monitor the borrowers, and participants that rely on the information provided by the lead arrangers (Ivashina (2009) and Sufi (2007)). Since the loan pricing decisions are taken by the lead arrangers, as in previous literature we focus our sample on them (e.g., Degryse et al. (2023)).

We obtain our climate change data from the S&P Trucost Database. Trucost provides granular information on the environmental damage of firms. We provide information on the variables and their summary statistics in Table 1. The key variable of interest in our analysis is the total environmental impact, that is defined by Trucost as the environmental costs that a company inflicts on the environment through its own activities as a percentage of revenue. The total environmental impact measures the sum of the direct and indirect environmental impact ratios. The direct environmental impact is defined as the direct environmental costs that a company inflicts on the environment through its own activities as a percentage of revenue. The indirect environmental impact is, on the other hand, the environmental impact that a firm inflicts on the environmental through the goods and services that it purchases.

Our data sample covers the period 2004-2019. Dealscan provides us with information on the loan characteristics, such as the loan interest rate, size, and maturity. We also have data on the non-pricing characteristics of the loans, such as the covenants and the collateral status, and the syndicate structure such as the presence of non-bank investors. We report the summary statistics in Table 1. Our key left-hand-side variable of interest is the all-in-spread-drawn measure, which we winsorize at the 1% level to remove outliers, has an average value of 224 bps. The all-in-spread-drawn (AISD) captures the interest rate paid by the borrower over the London Interbank Offered Rate (LIBOR) including any annual and/or upfront fees at the origination of the loan.

Graph 1 presents the histogram of the total environmental impact of the U.S. firms in our sample.

The distribution shows that most firms have a total environmental impact ratio as a proportion of their total revenue that ranges between 0 and 10 %. The average value of the total environmental impact of the U.S. firms has remained persistent over time and is around 4-8 % (Graph 2) even though it has declined slightly after 2015. As also shown in the Summary Statistics (Table 1), we observe a substantial dispersion in the environmental impact of the firms: while on average the total environmental impact as a percentage of revenue equals 4% percent, the distribution is heavily right-skewed, with a standard deviation of 8 %.

Trucost decomposes the total environmental impact of firms into six different categories: the natural resources, air pollutants, green house gas (GHG) emissions, water, land and water, and waste impact ratio. They also classify firms into six different sectoral groups. Based on the Trucost sectoral categorization, we document the average total and direct environmental impact of firms in different sectors (Graph 3). We observe that the total environmental impact of the U.S. firms is more concentrated among certain sectors, such as Consumer Staples, Energy, Materials, and Utility. We also observe that whereas the *direct* environmental impact is the main source of the *overall* environmental impact, some sectors such as Consumer Staples and Materials have higher *indirect* environmental impact ratios. This suggests that some firms have a greater impact on the environment through their own activities relative to their impact through the goods and services that they purchase through the third parties. We winsorize all the impact ratios at the 1% level to mitigate the impact of any potential outliers.

We obtain data on the environmental beliefs and attitudes of the U.S. society from the Yale Climate Opinion Surveys. From these surveys, we obtain, at the state level, the percentage of the respondents who somewhat/strongly agree that they have personally experienced the effects of global warming and the estimated percentage who think global warming will harm them a moderate amount/great deal. The Yale Climate Opinion Surveys are conducted almost every year and span our entire sample period.

We draw our biodiversity risk measures from a number of available sources. First, we use the biodiversity risk measures constructed by Giglio et al. (2023). The authors develop both firm and

industry-level measures of biodiversity risk and have made the data publicly available. They propose three corporate-measures of biodiversity: (i) *count* that is an indicator that equals one if the company mentions biodiversity in at least two sentences in the 10-K statements, (ii) *negative* that is the number of negative biodiversity sentences minus the number of positive biodiversity sentences, and (iii) *regulation* which is an indicator variable that is one if the company mentions biodiversity in at least two sentences and at least one of them is about regulation in the 10-K statements. Second, Giglio et al. (2023) propose industry-based measures of biodiversity risk: (i) *the gdp-biodiversity risk* is the average industry-based biodiversity risk weighted by the GDP of each industry, (ii) *the employment-based biodiversity risk* is the average industry-based biodiversity risk weighted by the employment in each industry, (iii) *the area-biodiversity risk* is the share of protected areas, and (iv) the *the species biodiversity risk* is the share of endangered species. Second, we use the state biodiversity risk rankings from the 2002 April NatureServe Report. The rankings are based on the status and distribution of 21,395 plant and animal species drawn from the NatureServe Central Databases and attempt to provide a complete picture of the extinction risk across America. NatureServe constructs the biodiversity risk rankings in terms of percentage of the state's plants and animals that are at risk of extinction due to rarity or other conservation challenges and consist of species classified as extinct, endangered, and vulnerable. Both the data and rankings are publicly available. We cross-check our findings with a variety of biodiversity risk measures.

We obtain historical data on the state-level abnormal temperatures from the National Centres for Environmental Information (NOAA) and the state-level physical risk measures from the Federal Emergency Management Agency (FEMA). The state-level U.S. Senate election voting outcomes are obtained for the period 1976-2020 from the MIT Election Data and Science Lab.

Finally, we use the Dealscan-Compustat Linking Database (Chava and Roberts (2008)) and obtain the financial statement data for the borrowers from Compustat. As consistent with the prior literature, we use the accounting data of the borrowers to control for their credit risk and add a variety of measures such as firm size, cash holdings, profitability, and leverage ratios.

3 Empirical Design

We use a simple loan pricing model to study whether banks penalize firms for their environmental impact. The baseline regression specification we run is the following:

$$loan\ rate_{ijt} = \beta \times impact_{it} + \alpha \times X_{it-1} + \gamma \times Z_{ijt} + \eta_{j \times t} + \epsilon_{ijt} \tag{1}$$

where i indexes firms, j indexes lender, and t year of the loan origination. The loan rate refers to the annual interest rate spread over $LIBOR$ paid by the borrower i to the lender j in bps for each dollar drawn down, including the fees. $Impact_{ijt}$ is the impact that the borrowing firm has on the environment as a percentage of total revenue at the time of the loan origination. We use a variety of dependent variables to capture the environmental impact, such as the direct impact ratio, indirect impact ratio, and total impact ratio (the sum of the direct and indirect impact ratio). We also study the different types of environmental impact separately and replace the impact variable with the natural resources, air pollutants, GHG emissions, water, land and water, and waste impact ratio.

As our aim is to capture the impact of the environmental footprint on the loan prices, we control for other factors that may affect the cost of debt. X_{it-1} are the borrower controls such as log(assets), log(total debt), and ebitda/assets in the year prior to the loan origination controlling for the borrower characteristics that have been shown to affect loan prices. Smaller, more indebted, and less profitable firms pay higher rates on their borrowing (Ivashina (2009), Lim et al. (2014), and Berg et al. (2016)). In our baseline specification, we include $FE_{j \times t}$ to control for any time-varying and unobservable heterogeneity across the lenders. The interpretation is that we compare, for the same lender and in the same year, the penalty imposed on a borrower with a higher environmental footprint. However, in other specifications, we add FE_j as the lender fixed effects and separately control for the lagged lender-specific characteristics such as log(total assets), capitalization, and return on assets. Larger, more capitalized, and more profitable lenders may lend at more favorable rates at the loan origination. The lender controls are consumed when $FE_{j \times t}$ is included. As the loans issued by the same lender

may have correlated spreads, we cluster the standard errors by lender.

All our specifications include state and sector fixed effects to absorb the average impact of the borrower state and industry on the loan rates. We control for the sector by adding the sectoral classification dummies. Z_{ijt} is the set of controls for the non-price loan terms such as the loan size and maturity as larger and longer-maturity loans have been shown to have lower spreads (see for example Carey and Nini (2007)). This may be due to the greater transparency of the larger borrowers who take larger loans, and the fixed costs of issuing a loan. We also add dummy variables for the loan purpose[6], the presence of covenants, and non-bank participation. Ivashina (2009) and Lim et al. (2014) have shown that loan facilities with non-bank institutional investors are associated with higher spreads than similar bank-only facilities. We also control for the relationship lending by adding a variable that captures the number of past interactions with the lender. Thus, our coefficient of interest β captures the rate penalty imposed on a borrower with a higher environmental impact ratio across the loans originated by the same lender, controlling for borrower characteristics and non-price loan terms.

We then proceed to use the sudden Trump withdrawal from the Paris Agreement as a shock to the environmental riskiness of the borrowers. Our key identification feature lies in the fact that the environmental deregulation was suddenly challenged by a group of green and left-wing states, and it is thus unlikely to equally affect all borrowers. Borrowers in the non-green states are unlikely to face green social and political pressures and are thus more likely to relax their environmental attitudes in response to the deregulatory moves of the Trump administration. Most importantly, the environmental deregulation is likely orthogonal to the lender characteristics such as bank capitalization, or borrower demand. We augment our baseline specification in a triple difference-in-difference-in-differences specification as follows. Our deregulation indicator takes one after Trump has announced the withdrawal from the Paris Agreement and zero otherwise. We classify a borrower as treated if it is in a state that has challenged the environmental deregulation in the court or in a state unlikely to challenge the government as it is predominantly Republican. We run the following specification.

[6]Loans for acquisitions and LBOs tend to lead to higher spreads due to risk

$$\begin{aligned} \textit{loan rate}_{ijt} = \beta \times \textit{impact}_{it} + \mu \times \textit{no-lawsuit-state}_i + \delta \times \textit{no-lawsuit-state}_i \times \textit{deregulation}_t \\ + \kappa \times \textit{impact}_{it} \times \textit{deregulation}_t + \lambda \times \textit{deregulation}_t \times \textit{impact}_{it} \times \textit{no-lawsuit-state}_i \\ + \alpha \times X_{it-1} + \gamma \times Z_{ijt} + \eta_{j \times t} + \epsilon_{ijt} \end{aligned} \tag{2}$$

where μ captures the time-invariant characteristics of the firms in the states that have not challenged the deregulation relative to the other states and δ reflects the relative change in the loan rates in the non-challenger states after the deregulation. κ is the average change in the price of the environmental impact after the deregulation. Finally, λ is our triple difference-in-difference-in-differences (DIDID) coefficient of interest that captures the change in the sensitivity of the loan rates to the environmental impact after the deregulation in the affected states relative to the unaffected states. Our full specifications also control for the borrower characteristics that affect demand and the non-price features such as loan size and maturity that may also be affected by the deregulation. We also control for lender $\times$ year FE, to account for the time-varying changes in the lender green attitudes and preferences.

4 Empirical Results

We first study whether banks consider the environmental damage of their borrowers in their lending decisions. We find that they charge higher rates to the borrowers with a higher impact on the environment, such as water, air, and land pollution, use of natural resources, and waste. The effects are robust to the inclusion of borrower fundamentals, and non-price deal characteristics. In all our specifications, we control for the lender $\times$ year FE to account for the time-varying changes in the green attitudes and preferences of the lender. We then go on to study the borrower- and lender-level heterogeneity to understand the underlying mechanism behind the price response.

4.1 Pricing of Environmental Damage

In this section, we report the baseline results on the impact of environmental footprint on the cost of bank credit. We run our main specification 3 and analyze the relationship between the loan prices and environmental damage (the ratio of environmental costs as fraction of total revenue). All our columns have lender × year FE, as we compare for the same lender in the same year the differential rates charged to the borrowers with a greater environmental footprint. This is important as in our pricing regressions, we aim to insulate our pricing effects from time-varying unobserved shocks and lender characteristics that determine the credit supply. We also want to control for the green attitudes and preferences of the lenders and focus on the risk management motive, *i.e.*, demand compensation for bearing more environmental risk.

The premise of our empirical design resides in the hypothesis that lenders account for the environmental impact of the borrowers in their credit origination. We report the baseline results in Table 2. In column 1, our coefficient of interest is both statistically and economically significant. For a one-standard deviation increase in the total environmental impact, lender charge a 2 pp higher interest rate on the loan relative to the mean (8.32 × 0.555 / 224). In Column 2, we control for the borrower characteristics that have been shown to affect the cost of credit. We control for the size, leverage, and profitability of the borrower as these characteristics affect the informational asymmetry and riskiness of the borrower. We also control for the sector and state of the borrower to control for the time-invariant sectoral and geographical factors affecting borrower demand and absorb the cross-sectional differences across different states and industries. We find a small reduction in our coefficient of interest to 0.9 pp (8.32 × 0.555 / 224), consistent with our interpretation that banks perceive environmental damage as a material risk factor.

As we aim to capture the impact on the price of credit, we also include the non-price loan characteristics such as loan size and maturity, in addition to the dummies that classify the type and purpose to control for any mechanical cross-sectional differences that may arise due to the riskiness of the loan.[7]

[7]These controls can be considered "bad" in the sense of Angrist and Pischke.

More specifically, we control for the size and maturity of the loan, non-bank participation, presence of covenants, and deal purpose. Our results remain qualitatively unchanged. This suggests that banks demand compensation for their exposure to the environmental risk in the form of higher interest rates.

We also want to understand the distribution of loan rates' sensitivity to environmental damage, as lenders may only choose to penalize borrowers for very substantial damage, and the effects may be non-linear. For this end, we use quantile regression methods in the spirit of Koenker and Bassett Jr (1982) and Firpo et al. (2009).[8] This simple framework allows us to observe the distributional properties of the loan rate variable across different quantiles of the outcome variable (loan rate) and identify the lender response to unit changes in environmental impact at the margin, controlling for borrower, and deal-level characteristics. Across different quantiles, borrowers likely have similar characteristics as they receive a similar rate. In Graph 4, we find that lenders specifically penalize borrowers for environmental damage when they are already riskier and receive high rates from their lenders. For low levels of borrower risk, however, lenders are so tolerant that the rate-impact sensitivity becomes negative. For high levels of risk (loan rate), in contrast, the rate-impact sensitivities are persistent and similar in magnitude to our baseline estimates in Table 2.

One question that arises is whether lenders price all sources of environmental impact or rather focus on the short-term and salient risks. We therefore analyze the direct and indirect environmental impact separately. The direct impact is the direct costs on the environment whereas the indirect impact captures the environmental impact that arises through the goods and purchases purchased by the firm from the third parties. Columns 4-6 replaces the total impact with the direct impact measure in our baseline specification 3. We find that the impact-price relationship is mainly due to the direct impact as our coefficient of interest is only slightly reduced. In economic terms, for a one-standard deviation increase in the direct environmental damage, lender charge a 3 pp higher rate on the loan. The effects again remain robust to the addition of borrower and loan-level controls. When we replace our impact variable with the indirect impact measure, our results become statistically insignificant in

[8]Currie et al. (2023), for example, use the quantile regression methodology to document the distributional differences in pollution exposure across the Black and White communities.

our most complete specifications. These results suggest that lenders scrutinize borrowers mainly based on their direct exposure to the environment. This may be because the indirect effects are less salient and thus seen as less material.

However, the total environmental damage seems to be most important priced factor in the data both economically and statistically. The most likely explanation is that banks may potentially screen their borrowers on the total impact that they have on their environment.

Trucost categorizes the environmental footprint of firms into six main categories: natural resources, air pollutants, GHG emissions, water, land and water, and waste. These groups reflect the environmental reliance and damage of borrowers in a variety of categories: Natural resources impact (the use of natural resources such as minerals, metals, natural gas, oil, coal, forestry, and agriculture), air pollutants (the costs of air pollutants), GHG emissions (the value of GHG emissions), water use (the dollar value of the use of water), land and water pollutants (the value of land and water pollutants), and waste generation (the dollar value impact of the waste generation). All variables are scaled by revenue and thus reflect to what extent the production and revenues of the firm depend on and affect the environment. To understand the pricing sensitivity to these different types of environmental impact, we replace our impact measure with these six different categories and replicate our baseline analysis with specification 3. We report the results in the Appendix Table 1. We find that even though the total environmental impact of firms is reflected in the cost of credit, only certain types of impact is priced. In the upper panel, we find that the reliance and the use of natural resources is seen as a material risk factor, but the economic magnitude is small. For a one-standard deviation increase in the direct environmental impact on natural resources, lenders charge a 0.5 pp higher interest rate on the loan.

We then extend our analysis to the water pollution, and the impact on the land and water in Columns 4 and 9. We find that our coefficient of interest is significant in our most complete specifications in Columns 6 and 9. In terms of the economic magnitudes, a one-standard deviation increase in the total environmental impact on the water (the land and water), lenders charge a 1.6 (5.6) pp higher

interest rate on the loan relative to the mean. Surprisingly, the impact on the land and water pollution is seen as the most material risk factor. One potential interpretation is that in the U.S., the water and land remain among the most controversial environmental regulations. For example, the Waters of the United States (WOTUS) rule frequently updates the scope of the federally protected waters under the Clean Water Act and changes the protections for the protected land and the threatened species.

In the lower panel, we also investigate the pricing implications of air pollution and GHG emissions. Remarkably, we find that lenders fail to account for air pollution in the loan prices. One potential explanation is that banks account for air pollution at the extensive margin rather than in the form of higher interest rates. For example, after the Paris Agreement, many firms committed to net-zero targets and reduced their carbon emissions. The U.S. has also introduced a variety of regulations that limit air pollution. Ivanov et al. (2023) study the impact of the cap-and-trade policies on the GHG emitting firms and show that the California and Waxman-Markey cap-and-trade bills led to a reduction in the loan maturities, a lower access to term loans, and higher interest rates[9]. In a related paper, Kacperczyk and Peydró (2022) show that in response to the commitment to the net-zero targets of the Paris Agreement, banks have reduced their total lending to firms with high scope-1 emission levels and reallocated credit towards the green firms.

We finally consider the impact of waste generation. Our coefficient of interest is negative and statistically significant in Columns 7-9, suggesting that waste is perceived as a natural outcome of production that is not a material risk factor. Broadly taken, our results indicate that lenders demand compensation for the environmental risk in the form of higher interest rates, but the effects mask substantial heterogeneity as lenders only scrutinize salient and certain types of environmental risk.

4.2 Lender-Based Heterogeneity

We now raise the question why banks price the environmental impact and damage inflicted by their borrowers. Banks may require higher prices for lending to environmentally reliant firms more heavily

[9]The cap-and-trade programs cap the GHG emissions at a threshold, and requires firms to use the allocated emission permits or purchase the permits at auctions, leading to a market price for carbon.

exposed to the physical or regulatory transition risk. If this is the case, we would expect the pricing effects to apply more forcefully to the lowly capitalized banks. Equity issuance is costly due to asymmetric information as bank investors may interpret a bank's decision to issue equity as a signal that the stock is overvalued. In the presence of asymmetric information, banks that are lowly capitalized may be more risk averse as they are less likely to issue new equity and able to absorb losses in the face of unexpected environmental losses.

A large body of literature has studied the impact of low capital on bank pricing behavior. In an early study, Boot et al. (1993) study the trade-off between reputational and financial capital and theoretically show that low capital makes banks more willing to exploit borrowers to raise their short-term earnings. In Froot and Stein (1998), banks with low capital become more risk averse and charge a higher risk premium to their riskier and bank-dependent borrowers. In Diamond and Rajan (2000), the risk of bank runs leads lowly capitalized banks to extract higher rents from their borrowers as it makes liquidation threats more credible and increases their bargaining position. Motivated by these theories, a large body of empirical work has documented that bank capital impacts loan rates. In a sample of U.S. bank loans to public firms, Hubbard et al. (2002) show that low-capital banks charge higher rates to borrowers with high switching costs. Mattes et al. (2013) provide evidence from the U.K. that low capital firms charge higher rates to privately firms than publicly held firms. In a more recent study, Santos and Winton (2019) study the publicly traded U.S. firms and show that banks charge higher prices to their borrowers with low cash flows.

We therefore conjecture that compared to the high capital banks, low capital banks would be more likely to penalize borrowers for their environmental impact. More specifically, brown borrowers are more exposed to environmental risk that may for example affect their cash flows, asset volatility, reputation, and profitability. Lenders would then anticipate higher expected losses from these borrowers with a larger drain on their capital reserves.

We divide our sample between loans extended by banks with low and high capitalization. We categorize banks as lowly capitalized based on whether they have lower equity to asset ratios than

the sample median in any given year. We then re-run our baseline regression specification 3 on these two sub-samples separately in Table 3. All our specifications are fully saturated and include both lender × year FE and borrower and loan controls. The coefficient of interest is positive and statistically significant, and its economic magnitude significantly increases relative to our baseline regressions. Most importantly, the effect is small and statistically insignificant in the sub-sample of lowly capitalized banks. Turning to direct environmental impact, we find similar results. These results suggest that banks consider the environmental impact of their borrowers in their loan pricing, but only if they are highly capitalized, consistent with theoretical predictions that low bank capital leads banks to charge higher rates to their riskier borrowers (Froot and Stein (1998)).

We also add direct evidence on the regulatory capital motive by looking at the lead shares. Banks reduce their skin-in-the-game to the borrowers that have higher default risk and require more regulatory capital in the secondary loan markets (Irani et al. (2021)) and at the loan origination (Erten (2022)). We report our finding in Table A4. We find that controlling for borrower and deal fixed effects, lead arrangers reduce their loan shares to borrowers that create environmental harm. This lends further support to the view that bank sensitivity to environmental damage is driven by considerations of borrower risk[10]. This is consistent with the survey evidence in Krueger et al. (2020) that institutional investors acknowledge the financial and regulatory implications of climate risk.

4.3 Borrower-Based Heterogeneity

To gain better insights on the bank behavior, we use a cross-sectional analysis and study what drives banks' environmental risk perception. In a notable contribution, Krueger et al. (2020) use survey evidence and show that institutional investors acknowledge the financial implications of climate risk and believe that regulatory risks already started to materialize. Banks may see environmental risks as material and adjust their pricing behavior if they expect future financial losses that they are unable to hedge and diversify. In the context of syndicated bank loans, we consider three different channels:

[10]Reputational concerns are unlikely to drive this response as lead arrangers maintain a higher share of the loans that they originate for reputational purposes

local beliefs and preferences, biodiversity risk, and environmental regulation.

4.4 Personal Beliefs

Personal Beliefs Heterogeneity

To gain deeper insights into what drives the price response to environmental risk, we study the beliefs and preferences in the local area of the borrowers. Regulators in the states prone to climate change denial may be less likely to enforce climate change rules as they face less political pressure.[11] It may also be the case that the local state-level regulators are more likely punish the borrowers for their environmental harm in the "green" states. Firms that damage the environment are also less likely to face unexpected disruptions in demand from the climate activists and pro-climate consumers. Our conjecture is that lenders are less likely to price environmental risk if the borrower is in a "climate-denier" (brown) state.

We then split our sample into different groups based on the environmental attitudes in the state in which the borrower is located. We aim to capture the dispersion across borrowers in terms of their climate change attitudes. We use two different measures: personal experience (the estimated percentage who somewhat/strongly agree that they have personally experienced the effects of global warming), and personal harm (the estimated percentage who think global warming will harm them personally a moderate amount/a great deal). Personal experiences undoubtedly increase the awareness of global warming and thus the personal experience measure can proxy for climate awareness. Personal harm, on the other hand, can capture the extent to which the local population is concerned about global warming. We classify the states as climate deniers if the proportion of the respondents who agree that they have experienced the effects of global warming or think that global warming will harm them personally is lesser than the country median.

The Yale Survey evidence reveals substantial geographic dispersion in the beliefs and attitudes

[11] Climate change denial is also subject to a global policy debate. van der Ploeg and Rezai (2019) study the price of carbon with an agnostic approach that assigns a positive probability that climate change deniers are right, and show that the price of carbon is only marginally reduced.

towards global warming. We draw the histogram of these two measures to understand the distribution of the climate change awareness and concerns in Graph 5. The above figure presents the histogram of the average estimated percentage who think global warming will harm them personally in the Yale Climate Opinion Survey during our sample period. As can be seen, there is substantial variation in the social attitudes, and climate change denial is surprisingly common as on average, as only half the local population tends to have pro-climate preferences and the distribution is heavily right-skewed. In the below figure, we show the average estimated percentage who agree that they have personally experienced the effects of global warming in the Yale Climate Opinion Survey. The distribution of the two measures is strikingly similar, and they have a correlation of 81% in our data, suggesting that both measures capture very similar aspects of the local pro-climate attitudes.

To study the role of the climate beliefs and preferences, we split our sample into two different sub-samples and run our baseline regression 3 in the states that are (not) climate deniers separately. In Panel A, we do our sample splits based on the percentage of borrowers who reported that global warming will harm them personally. We report our results in Table 4. Column 1 shows that the coefficient on the total environmental impact is insignificant for the borrowers located in the climate denier states. In the pro-climate states, however, our coefficients are all statistically significant and more than doubles in magnitude relative to our baseline specifications (Column 2). We obtain similar effects when we look at the direct environmental impact of the borrowers.

In Panel B, we do our sample splits based on the personal experiences, and the proportion of the survey respondents who responded yes to having personally experienced global warming. Our coefficient of interest is again positive and statistically significant for the pro-climate states. The effects and magnitudes on the sub-sample analysis based on the personal experience in Panel B are consistent with Panel A where the splits are done based on personal harm. The effects on the climate denier sub-sample remain insignificant and the pricing sensitivities only appear in the green states. Thus, in the cross-section of loan prices, the dispersion of environmental beliefs and attitudes are reflected in the loan prices demanded by the lenders. Overall, our findings suggest that lenders tend

to penalize borrowers for their environmental risk only in the pro-climate states, suggesting that the environmental risk perception is related to the local beliefs and preferences.

Finally, we also consider the possibility that biodiversity risk may be relevant on the environmental risk sensitivities. From the Yale Surveys, we also obtain the biodiversity harm measure which is the estimated percentage of the population who thinks that global warming will harm plants and animal species a moderate amount/a great deal. We categorize a state as biodiversity-insensitive (sensitive) if the proportion of the public who believes that biodiversity will be harmed is lesser (greater) than the median and zero otherwise.

In Panel C, we split our data into two samples with biodiversity sensitive and insensitive states. In Columns 1 and 2, we find that only in biodiversity-insensitive states, banks are more likely to account for environmental damage at loan origination. Thus, the biodiversity risk considerations are unlikely to play a role in the sensitivity to environmental harm. We however see that this measure is only available for a very small number of years and shows very little dispersion in the cross-section of states. Table 1 suggests that the majority of the public (68% on average) agrees that global warming will harm biodiversity (Table 1).

Shocks to Local Beliefs

We next attempt to isolate random shocks to personal environmental beliefs. We also differentiate between climate and biodiversity risks. Our main conjecture is that banks become more responsive to environmental damage if the risk of global warming and the threats to biodiversity become more salient and plausible.

We capture the salience of the environmental risks with the local short-term temperature anomalies.

Our identification assumption is that the timing of such anomalies is random and exogenous to the lender and borrower fundamentals. We augment our baseline specification in a DIDID specification 3 and we interact the total impact of the borrowers with the short-term weather anomalies.

As the sensitivity of loan rates to environmental impact is significantly affected by pro-global warming attitudes, we examine weather changes and global warming more closely. Specifically, we

consider short-term abnormal weather conditions as an exogenous shock to personal beliefs. It may be the case that banks become more likely to account for the environmental impact of their borrowers at loan origination if there are abnormal heat waves, unexpectedly increasing environmental concerns in the local area of the borrower. Our idea is that local weather anomalies may surprise the local community and make environmental threats more credible. To that end, we use data on the abnormal weather conditions at the state level that may affect the environmental risk response of the lenders.

In a theoretical framework, Pástor et al. (2021) predict that green firms outperform brown firms in response to unexpected increases in climate change concerns. Choi et al. (2020) provide supporting evidence with international data that attention to climate change, measured by abnormally high temperatures, leads stocks of carbon-intensive firms to underperform firms with low carbon emissions. Ardia et al. (2023) similarly show that green firms outperform brown firms in response to unexpected increases in climate change concerns. In the below analysis, we adopt a similar approach in the U.S. syndicated loan market.

We obtain the abnormal weather data from the National Centres for Environmental Information (NOAA) that provides historical time-series for every month on the average temperatures observed in that state. The time-series also provides us with data on whether these temperatures can be perceived as abnormal, or a deviation based on the historical state-level data that covers the 1901-2000 monthly averages. We use the data on the local temperatures in two ways. First, we take the abnormal temperatures at the year-month level as local surprises are likely to make the environmental risk more salient. Second, we create an indicator variable that takes one if the abnormal temperature is positive, *i.e.*, the abnormal weather at the time is consistent with global warming.

We conjecture that negative weather news consistent with global warming make environmental risk more credible and affect the implications of environmental exposures on the total cost of bank credit. Thus, we expect lenders to become more likely to penalize borrowers for their environmental damage in the months when global warming is more plausible.

We augment our baseline specification by interacting our total environmental impact measure with

abnormal weather deviations and indicators that take one if the weather deviation is positive and consistent with global warming. We report the results in Table 5[12].

In Column 1, we see that in the unconditional specifications, even though the interaction term on the impact and abnormal weather is positive, it is barely significant. However, when we add borrower controls in Column 2 and deal controls in Column 3, the coefficient on the interaction terms becomes both economically and statistically significant. Across all these specifications, the total impact variable remains of similar quantitative magnitude to our baseline estimates. This suggests that accounting for the borrower and the non-price deal characteristics, banks become even more likely to penalize borrowers for their environmental harm when environmental risk becomes more salient. Thus, there is an additional risk premium demanded by the banks at times of weather anomalies. In particular, for the average rate of abnormal warming in the U.S., there is an additional spread penalty of 32 bps.

The weather anomalies are short-term in nature and exogenous to both lenders and borrowers. Most importantly, they are unlikely to affect the borrower demand in our regressions as firms have applied for the loans weeks in advance and the syndication process and the deal rates take time to materialize. Our total impact measures are also very persistent in the data and driven by the borrower FE (95% R-Squared). It is very unlikely that the total environmental impact measure can change in such a short period. Furthermore, as we have Lender FE, we examine the pricing heterogeneity for the same lender imposed on the borrowers located in different states subject to different levels of abnormal temperatures[13]. Thus, the results suggest that local beliefs and attitudes in the borrower state impact the pricing of the borrowing firms' environmental footprints.

It is worth emphasizing that we account for the lender's location with Lender FE across all our specifications. Thus, in our baseline specifications, our results arise from the borrowers' heterogeneous exposures to environmental concerns.

In Columns 4-6, we also replace abnormal temperatures with an indicator that takes one if they

[12]We replace Lender x Year by Lender FE and remove State FE as our abnormal temperatures measure is captured at the monthly-year level.

[13]We remove the state FE and the year FE as the weather anomalies are measured as deviations at the state-year-month-level.

are positive or if the weather is consistent with global warming. With this alternative specification, we find that interaction terms are all significant and positive. Thus, environmental sensitivity is more likely at times when global warming is locally more salient and plausible.

As an additional margin, we test whether abnormal temperatures in the headquarters of a U.S. parent bank impact the pricing sensitivity to environmental damage. We report the results in Table A8 for the U.S.-based lenders. The coefficients in the main regressions are positive and significant at the 5% level (Column 1). When we account for the borrower and deal-level characteristics, however, this lender sensitivity becomes insignificant (Columns 2 and 3) suggesting that lenders respond with non-price features. When we only look at global warming by interacting environmental impact with measures of abnormally warm temperatures, we find that lender sensitivities to abnormal temperatures are consistent with the main results in Table 4 and somewhat larger in terms of economic magnitudes.

In the Appendix Table A5, we also replicate our analysis with the level of short-term temperature fluctuations at the state level, controlling for Lender $\times$ Year and state FE. We see that even when we examine the absolute value of temperature fluctuations (rather than surprises), the interaction terms with environmental impact are positive and statistically significant once we account for borrower and deal characteristics. Specifically, for the average temperature across the U.S. states, a one standard deviation increase in the total environmental impact raises loan rates by 2.74 pp. In Columns 3-6, we also create an indicator variable that takes one if the temperatures are in the upper 25% based on the state averages during the sample period. When we interact this indicator variable with our impact measures, our environmental sensitivity measures more than double relative to our baseline specifications. Overall, high or extreme temperatures are associated with larger environmental pricing penalties for environmental harm.

Decomposing Local Beliefs

What explains the observed response? As environmental risks consist of physical and transition risks Li et al. (2024), one could decompose local beliefs within the context of physical and transition risks. Abnormal temperatures can lead lenders to revise their expectations in the likelihood that

state-level authorities introduce new environmental regulations or enforce existing laws. Alternatively, lenders may reassess the extent of physical risk at times of local abnormal temperatures.

Using a comprehensive dataset that covers 45,199 individuals from 32 countries, Zhou (2015) shows that conservative beliefs play a determinant role in environmental attitudes. Political scholars have also shown that right-wing voters are more likely to reject climate and environmental policies, whereas left-wing communities promote environmental and climate regulation. In the US context, this means a significant polarization in the environmental attitudes between Democrats and Republicans, as the former are more likely to vote for state-level environmental regulations (Neumayer (2004), Guber (2013), Huber (2020)). Democratic views also affect ESG preferences more generally: Di Giuli and Kostovetsky (2014) show that firms tend to have a superior CSR performance when they are headquartered in Democratic rather than Republican states. Households in the U.S. also tend to invest in portfolios that align with their politically shaped values in terms of social and environmental preferences (Pan et al. (2024)).

We thus use the difference between the more recent Democrat and Republican vote shares in the Senate elections to capture the time-varying local transition risk over time[14]. We expect environmental sensitivity to increase more strongly in the Democrat-majority states at times of abnormal temperatures. We first show that a higher Democrat-Majority gap is associated with a higher risk premium for environmental impact (Column 1). Furthermore, in response to abnormal temperatures, environmental sensitivity increases more the larger the Democrat-Republican gap is. For the average abnormal temperature and environmental damage, a one percent increase in the Democrat-Republican share increases the environmental sensitivity by an additional 0.3 bps (Column 2).

Similarly, abnormal temperatures may also lead lenders to reassess their perceptions of physical risk and perceive borrowers who operate in low-physical-risk states as riskier[15]. We first show that lenders

[14]The U.S. Senate is responsible for the lawmaking within the United States, with each state equally represented. We obtain from the MIT Election Data and Science Lab the constituency (state-level returns) for elections to the U.S. Senate from 1976 to 2020 to examine the binding local beliefs within the context of regulatory risk (environmental laws and enforcement) in the borrower state.

[15]We obtain the physical risk measure from the Federal Emergency Management Agency (FEMA) National Risk Index that captures the natural risk hazard across the different U.S. states

generally charge higher rates to borrowers with higher environmental damage if they operate in states subject to higher physical risk (Column 4). Furthermore, in response to abnormal temperatures, environmental sensitivity increases more in states with lower physical risk (Column 5). When we examine the role of physical and transition risk together in the same regression, however, we find that the coefficient on the Democrat-Republican gap remains largely unchanged while physical risk becomes insignificant (Columns 6 and 7). Overall, the results suggest that local beliefs, especially within the context of transition and regulatory risks, determine the cost of bank credit.

4.5 Biodiversity Risk

An additional question that arises from our earlier analysis is the role of biodiversity risk. Biodiversity loss concerns may be another key factor that may lead banks to demand compensation for the environmental damage of the borrowers that we observe.

Biodiversity refers to the variety of life on Earth, including animals, plants, bacteria, and fungi. The 2022 United Nations Biodiversity Conference in Montreal (COP15), the United Nations Assessments documented that 80% of the world species are threatened by economic activity, and that 40% of global land surfaces are degraded. Based on the 2023 NatureServe report, 34% of plant species and 41% of animal species are at a risk of extinction in the United States.

Firms that are environmentally reliant may face adverse consequences from global warming that increasingly threatens ecological biodiversity. For example, drought spells may lead food companies to stop or to reallocate production. The extinction of certain species may increase social and moral pressure on the fossil fuel firms, leading to stricter limits on the carbon emissions. Extreme weather events from global warming can harm agriculture and displace workers, resulting in labor shortages. Firms may also anticipate stricter regulations that preserve biodiversity, in the light of the recent global initiatives such as the 2021 Kunming Declaration and the 2022 Montreal Agreement. If banks consider biodiversity risk, we expect their lending to be more sensitive to the environmental harm of their borrowers in the areas subject to greater biodiversity risk exposure.

Giglio et al. (2023) construct news-based measures of biodiversity risk for the U.S. firms and show that it varies substantially across sectors and it affects equity returns. Garel et al. (2023) introduce a measure of biodiversity and show that in an international sample of stocks, the biodiversity footprint is not priced in the cross-section of stock returns. They however find that in the aftermath of the Kunming Declaration, stocks with large biodiversity footprints have lost value, consistent with investors starting to demand a risk premium for biodiversity risk. We examine whether banks price biodiversity risk in the loan rates at loan origination.

Our first question is whether biodiversity risk drives our earlier findings on environmental harm. For this analysis, we exploit a number of different biodiversity risk measures. First, we use the state-level biodiversity index developed by NatureServe. The index ranks the 51 U.S. states based on the extinction risk of local biodiversity, using data from more than 21,000 plant and animal species. To facilitate the interpretation, we re-arrange the index so that higher ranks relate to greater biodiversity risk. We augment our baseline specification 3 by interacting our total and direct impact measures with the biodiversity risk rank of the state in which the borrower is located. We report the results in Table 7. We find that being in a state subject to higher biodiversity risk is associated with higher loan rates. Most importantly, the interaction term is positive and statistically significant, suggesting that the sensitivity to environmental impact rises the larger the state-level biodiversity risk.

To explore the cross-sectional variation in the bio-diversity risk more cleanly, we also use the bio-diversity risk time-series measures proposed by Giglio et al. (2023). The advantage of these measures is that they are firm-level and constructed from corporate disclosures. *Count* is an indicator that takes one if the company mentions biodiversity at least twice in the 10-K disclosures whereas *regulation* is a dummy variable that is one if at least one of these disclosures is about biodiversity regulation. *Negative* is the number of negative biodiversity sentences minus the number of positive biodiversity sentences in the 10-K filings. We interact these biodiversity exposure indicators with our impact measures and report the findings from our augmented specifications in Column 3-5. In all three columns, we find that banks demand higher rates from the firms that are subject to greater biodiversity risk and those with a

larger total environmental impact. Very interestingly, controlling for the total environmental impact, biodiversity risk is associated with higher rates, and an increase in the biodiversity risk measure is associated with a 20 to 30 bps increase in the loan rates.

The interaction term is however negative and statistically significant in all three specifications. This means that a lender is less likely to price the environmental harm of a firm subject to biodiversity risk compared to another firm without such biodiversity risk exposure. The individual coefficients on the biodiversity risk and the total environmental impact are both significant, however. In Columns 5-8, we show that all our results warrant a similar interpretation when we replace total environmental impact with direct environmental impact. Furthermore, the differential sensitivity to the environmental impact increases with all three firm-level measures of biodiversity risk – regardless of whether we consider the number of biodiversity mentions, and account for regulatory or negative news, and the magnitudes also go up to 26 to 36 bps (Columns 6-8). Overall, the results again suggest that lenders differentiate between the environmental harm and the biodiversity risk exposure their borrowers. It is unlikely that biodiversity risk can account for the pricing sensitivities to the total environmental impact that we have documented.

Thus, we turn our attention to the pricing of biodiversity risk individually. We consider both firm-level and regional exposures to biodiversity risk. In our baseline specification, we replace the total impact variable with a variety of biodiversity risk measures: count, regulation, negative, employment biodiversity state, GDP biodiversity state, area biodiversity state, and species biodiversity state. We run the following specification:

$$loan\ Rate_{ijt} = \beta \times biodiversity\ risk_{it} + \alpha \times X_{it-1} + \gamma \times Z_{ijt} + \eta_{j \times t} + \epsilon_{ijt} \tag{3}$$

where i indexes firms, j indexes lender, and t year of the loan origination. The loan rate refers to the annual interest rate spread over *LIBOR* paid by the borrower i to the lender j in bps for each dollar drawn down, including the fees. $biodiversity\ risk_{ijt}$ is the biodiversity risk of the borrowing firm at the time of the loan origination.

We report the results in Table . We find that the coefficient of count and regulation are statistically insignificant (Column 1 and 2) whereas the negative biodiversity news in the 10-K statements are strongly priced (Column 3). One negative biodiversity news results in a 10-bps increase in the loan rates and it is statistically significant and economically meaningful (4.44% increase in the loan rates relative to the mean). These results suggest that banks especially price the negative biodiversity news rather than merely their relevance at the loan origination.

We also study the regional measures of biodiversity risk. The coefficient on the GDP-weighted biodiversity scores is statistically insignificant (Column 4) and negative and barely significant for the employment weighted biodiversity scores (Column 5). Thus, banks do not price the industry-based measures of biodiversity risk, that may for example arise if the borrower is in an area that heavily relies on the energy dependent industries, such as oil and gas production and mining both in terms of GDP and employment. Such risks are likely absorbed by the industry and state fixed effects. The price impact of the area-biodiversity-state that captures the share of protected areas is also insignificant (Column 6). This is not surprising, as once the government restricts an area as protected, very little industrial activity and biodiversity harm can arise in the area. Column 7 however suggests that the share of endangered species has a very strong impact on the loan rates. A one percentage increase in the share of endangered species in the state of the borrower increases the loan rates by 2.37 pp relative to the mean ($88.69 \times 0.06 \ / \ 224$). This effect is comparable in terms of the economic magnitudes to the environmental impact measure.

Attention to Biodiversity Risk

One possibility however is that even though banks do not price all sources of biodiversity risk, they may still consider them when they become salient. We contemplate this possibility with measures of local interest in biodiversity issues in Table . We extend our baseline regression specification with the biodiversity risk measures and interact them with indicators that take one if the monthly biodiversity attention index at the time of the loan origination is greater than the sample average.

We find that in this extended specification, many interaction terms now become statistically sig-

nificant. In Column 1, the price impact of count is positive and statistically significant: the count measure or biodiversity relevance is associated with a 20 bps additional increase in the loan rates if the loan is originated in a month with a higher-than-average interest in biodiversity. In Column 2, the price impact of regulation is positive but barely significant, suggesting that the local interest is unlikely to significantly impact the loan rate sensitivity to biodiversity risk. We also find in Column 3 that the impact of the negative corporate level news on biodiversity have differential higher effects on the loan rates (24 bps) if the loan is originated at a period with a high attention to biodiversity. When we investigate the time-varying heterogeneity in the price response to the regional sources of biodiversity risk, we find that the interaction terms with the industry-based measures of biodiversity risk become positive and statistically significant for the GDP-biodiversity state measure (Column 4 and Column 5). The protected areas and extinction risk biodiversity measures are however not affected by the extent of local public attention (Column 6 and Column 7). This likely arises as the public is generally aware of the local presence of the protected areas and the species subject to extinction risk and that local attention is unlikely to make these risks more salient.

Overall, these results suggest that on average, banks price biodiversity risks that appear more substantial and threatening such as negative biodiversity news and extinction risks. They however start accounting for broad economic measures of biodiversity risk when public interest intensifies.

5 Trump Withdrawal from Paris

Our analysis documents that banks penalize borrowers for their environmental harm in the form of higher rates. In this section, we study the role of environmental regulation and we investigate the sudden and idiosyncratic withdrawal of Trump from the Paris Agreement. We propose that the environmental deregulation represents a shock to the perceived environmental risk of the borrowers, leaving the borrower fundamentals and the bank characteristics unchanged. This setting allows us to focus on one specific type of borrower risk – regulatory risk – in determining the lender response to the environmental impact of the borrowers and understanding more deeply how it varies across different

states with different local attitudes.

The Paris Agreement is a global and coordinated effort to tackle climate change which was signed in December 2015 at the UN Climate Change Conference (COP21) in Paris and came into force in November 2016. The agreement is a legally binding international treaty. With the objective of combating climate change, the treaty requires the signatory countries to commit to reducing their global greenhouse emissions and submit, every five years, a national climate action plan known as Nationally Determined Contribution (or NDC). It also provides a framework for disclosing and monitoring emissions to reach the net-zero targets. During 2016-2023, 194 countries, including the European Union, joined the Paris Agreement. The operational details for the practical implementation were released in December 2018, and finalized in November 2021.

The U.S. withdrew from and recommitted to the Paris Agreement during the 2017 and 2021. During his presidential campaign, Donald Trump called climate change a "hoax" and vowed to withdraw from the Paris agreement. He called for eliminating the restrictions on the energy explorations and opening more federal lands to drilling to reduce the dependency on the foreign energy and to create more U.S. jobs. He also stated that he would push for the approval of the controversial Keystone XL oil pipeline from Canada and withdraw any funding for the United Nations programs. During his presidency, however, he advocated a mixed position, and he stated that he had "an open mind" about climate change. Despite delays and ambivalent statements, Trump announced his decision to withdraw from the Paris Agreement on the June 1st, 2017.

The surprise withdrawal of Trump from the Paris Agreement presents an ideal setting to investigate the impact of the environmental regulation and the local attitudes on the lender behaviour. The set-up gives us a distinction between treated and untreated firms, as several cities and states have unexpectedly sued against the government for withdrawing from the Paris agreement, making it less likely to be enforced. It is also natural to expect the states with a Republican majority to be more likely to support the deregulation *ex post*. We present the challenger and Republican states in Graph 6, and Table A2-A3. As can be seen in Graph 6 (a-b), the states that have sued the government are

predominantly Left-wing and non-Republican. We conjecture that the environmental deregulation led banks to perceive environmental risk to be less material, but only in brown states. If this is the case, we would see a reduction in the response of the loan prices to environmental risks.

To test this hypothesis, we augment our baseline specification 3 by interacting our coefficient of interest with an indicator variable that takes one after Trump has announced his decision to withdraw his commitment from the Paris Agreement in June 2017. In our DIDID specification, we define treated as an indicator variable that takes one if the borrower is in a state that has not sued the Trump government for having withdrawn from the Paris Agreement. We run the specification 2 and report the results in Table 10. Our DIDID coefficient of interest is the interaction term on the total environmental impact, the deregulation event dummy, and the non-challenger state indicator. We find that controlling for the borrower- and deal-level characteristics, the coefficient on the interaction term is negative and statistically significant. The results suggest that after the deregulation, banks have reduced the sensitivity of their loan pricing to the environmental impact of their borrowers. For a borrower with an average total impact ratio, the deregulation is associated with a 4.9 bps decline in the sensitivity to a one percentage point increase in the total environmental impact ratio in the non-challenger-states relative to the states that have sued the Trump government. In Column 2, we replace the treated dummy with an indicator that is one if the borrower is in a state that has consistently voted for the Republican party during our sample period. The coefficient on the interaction term remains statistically significant and increases slightly to 5.27.

To further understand the mechanism driving these results, we investigate the heterogeneity by the area in which the borrower is located. In our augmented specification 2, we replace the treated indicator with other dummy variables that take one if the state is heavily prone to climate scepticism. In Graph 6 (c) we present the states with a higher than median climate denial measure in the year prior to the environmental deregulation, and we see that many of these climate-denier-states include the Republican states. Column 3 and 4 re-define the treatment group based on the personal harm and personal experience measures of climate denial. Our results in Table A6 have a similar interpretation,

as the effects appear more forcefully to the climate-denier-states. This is unsurprising as lenders likely consider the possibility that the borrowers located in the climate-denier-states are unlikely to face political pressure and regulatory scrutiny. Thus, our results are driven by the non-challenger and non-denier states, again suggesting that the price of environmental risk depends on the local beliefs and attitudes.

We then move on to the robustness tests. We test for the presence of pre-trends and add indicators for the years before and after the environmental deregulation. We also add interaction terms to our specification 2 where we define a treated firm as one if it is located in a state that has sued the Trump administration, or in a Republican state more likely to support the environmental deregulation, respectively. We plot the coefficient terms of these interaction terms in Graph 7. We find that the interaction terms with the year dummies before the deregulation are all insignificant, whereas the coefficients on the interaction terms with the years after the deregulation are all large and statistically significant. We find no evidence of pre-trends – which mitigates concerns around reverse causality and suggests that the Trump environmental deregulation led banks to reduce the sensitivity of their loan rates to the environmental impact of their borrowers.

We also acknowledge the fact that the withdrawal of the Trump administration has not applied equally to all environmental regulations. The focus has been on the air pollution, and the protection of the nation's biodiversity and wetlands. For example, the Clean Power Plan was replaced, with weaker restrictions on the GHG and mercury emissions. Other decisions limited the protection of sensitive lands. We acknowledge the different types of restrictions and anticipate that the price of environmental risk may have declined more substantially for land and water impact, air pollution, and GHG emissions. We contemplate this possibility in our Appendix and we replace our total impact measure with measures for different types of environmental impact.

We report our findings in Table A6. Our results are consistent with our predictions. We find that environmental deregulation is associated with a reduction in the price of environmental risk for land and water impact, air pollution, and GHG emissions. The interaction term of interest in our DIDID

specification is negative and statistically significant in Columns 3 (Table A6) and Columns 1 and 2 (Table A7). We find that relative to the lawsuit states, firms in the no-lawsuit-states have reduced their sensitivity of their loan prices by 8 to 25 bps after the environmental deregulation, controlling for the borrower and the deal characteristics. The effects are however insignificant for the natural resources, water, and waste (Columns 1 and 2 in Table A6 and Column 3 in Table A7). The results suggest that the withdrawal from the Paris Agreement has significantly reduced the price of environmental risk in the cross-section of the loan rates. In unreported tables, the regressions in Table A6 warrant a similar interpretation when the treated indicator is instead replaced with other dummy variables that take one if the firm is located in a Republican or a climate-denier-state.

6 Conclusion

The rising awareness of global warming and biodiversity risk have increased the transition costs of firms, but the impact on the bank behaviour is largely unknown. How banks account for environmental concerns in their lending decisions is poorly understood. In this paper, we document that banks penalize borrowers for their environmental damage with higher loan rates at origination, but only when they are lowly capitalized, and the borrowers operate in "green" states less prone to environmental denial. We find that biodiversity risk exposure is also priced by lenders and especially at times when public interest in it intensifies. Our results suggest that banks perceive the environmental harm and the biodiversity risk exposures of their borrowers as a material risk factor.

We also show that the Trump withdrawal from the Paris agreement has reduced the sensitivity of the cost of credit to the environmental impact of firms. We again find these effects in the areas that have not sued the government for deregulation and in the "brown" states with climate denial. An important implication of our study is that the pricing adjustments of transition may potentially depend on the local beliefs and enforcement rather than on the rules. In a regulatory environment where firms are unlikely to face local pressure and climate risk is seen as dubious, our paper shows that banks are also less likely to adjust their cost of credit!

Table 1: Summary Statistics

Variable	definition	mean	median	st.dev.
all-in-spread	The amount the borrower pays in basis points over LIBOR for each dollar drawn down including the annual fees	224.67	187.5	160.82
deal size	The amount the deal received commitments for (in USD)	440.2	1149.39	2519.97
maturity	How long (in months) the facility will be active from the signing date to the expiration date	55.47	60	38.93
covenant	Dummy indicator whether or not the facility has financial or net worth covenants	0.21	0	0.41
secured	Dummy indicator whether or not the facility is secured or collateral is held against the loan	0.38	0	0.49
non-bank presence	Dummy indicator whether or not the facility has non-bank participants or lead arrangers (corporation, finance company, investment firm, insurance company and mutual fund)	0.39	0	0.49
log(total assets)	The natural logarithm of total assets	5.63	5.77	2.85
log(total debt)	The natural logarithm of total debt	3.18	2.43	3.14
log(cash)	The natural logarithm of total cash	3.11	2.94	2.28
ebitda/assets	Earnings before interest divided by total assets	-1.47	0.05	39.88
personal experience	Estimated percentage who somewhat/strongly agree they have personally experienced the effects of global warming	34.23	33.56	6.63
personal harm	Estimated percentage who think global warming will harm them personally a moderate amount/a great deal	36.21	35.17	6.25
biodiversity harm	Estimated percentage who think global warming will harm plants and animal species a moderate amount/a great deal	68.04	67.89	5.42

Table 1 Continued

Variable	definition	mean	median	st.dev.
total impact	The sum of all the direct and indirect external environmental costs of the company as a percentage of revenue	4.02	1.51	8.32
direct impact	The sum of all the direct external environmental costs of the company as a percentage of revenue	1.81	0.12	6.23
indirect impact	The sum of all the indirect external environmental costs of the company as a percentage of revenue	2.01	1.19	2.85
natural resources impact	The sum of the direct and indirect use of natural resources as a percentage of revenue	0.19	0.04	0.89
water impact	The dollar value of the direct and indirect water pollutant quantities as a percentage of revenue	0.93	0.34	2.09
land and water impact	The dollar value of the direct and indirect land and water pollutant quantities as a percentage of revenue	0.18	0.06	0.45
air pollutants impact	The direct and indirect air pollutant costs as a percentage of revenue	0.59	0.24	1.11
ghg emissions impact	The value of direct and indirect ghg emissions as a percentage of revenue	1.53	0.58	3.02
waste impact	The dollar value impact of the direct and indirect waste generation by the company as a percentage of revenue	0.09	0.05	0.20
count	10K-Biodiversity-Count Score does the company mention biodiversity in at least two sentences in the 10-K statements?	0.03	0	0.16
negative	10K-Biodiversity-Negative Score the number of negative biodiversity sentences minus the number of positive biodiversity sentences	0.02	0	0.26
regulation	10K-Biodiversity-Regulation Score does the company mention biodiversity in at least two sentences and at least one of them is about regulation in the 10-K statements?	0.02	0	0.13
gdp bio risk	The average industry biodiversity scores weighted by GDP of each industry	13.25	13.05	1.26
emp bio risk	The average industry biodiversity scores weighted by employment in each industry	11.25	11.20	0.69
area bio risk	The share of protected areas	0.07	0.05	0.06
species bio risk	The share of endangered species	0.06	0.05	0.04
biodiversity news	The number of NYT-negative biodiversity articles minus the number of positive biodiversity articles on a given day (yearly average)	0.33	0.27	0.28
climate news	The number of NYT-negative climate articles minus the number of positive climate articles on a given day (yearly average)	0.09	0.07	0.09
biodiversity attention	The sum of the Google search index series for biodiversity loss, ecosystem services, and species loss in a given month (yearly average)	61.26	51	44.79

Table 2: Sensitivity of Loan Rates to Environmental Impact

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
total impact	0.555***	0.456***	0.248**						
	(0.129)	(0.143)	(0.116)						
direct impact				0.866***	0.444**	0.280*			
				(0.143)	(0.187)	(0.152)			
indirect impact							-0.665	1.630**	0.244
							(0.429)	(0.824)	(0.705)
No. obs.	31055	8658	8638	31055	8658	8638	31055	8658	8638
R-squared	0.40	0.47	0.60	0.40	0.46	0.60	0.39	0.46	0.60
Lender × Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Borrower controls	N	Y	Y	N	Y	Y	N	Y	Y
Deal controls	N	N	Y	N	N	Y	N	N	Y

This table reports the sensitivity of the loan rates to the environmental impact of the borrowers. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), log(cash) and ebitda/assets. Deal controls include deal size and maturity, secured and covenant status, and non-bank participation. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table 3: Environmental Impact and Lender Capitalization

	weak capitalization	high capitalization	weak capitalization	high capitalization
	(1)	(2)	(3)	(4)
total impact	0.462**	-0.0334		
	(0.191)	(0.152)		
direct impact			0.554**	-0.0539
			(0.255)	(0.190)
No. obs.	4312	4322	4312	4322
R-squared	0.56	0.64	0.56	0.64
Lender × Year FE	Y	Y	Y	Y
State FE	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y
Borrower controls	Y	Y	Y	Y
Deal controls	Y	Y	Y	Y

This table reports the sensitivity of the loan rates to the environmental impact of the borrowers for banks with high and low capitalization. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), log(cash) and ebitda/assets. Deal controls include deal size and maturity, secured and covenant status, and non-bank participation. Low capitalization takes one for a lender if the capitalization or equity to assets ratio is lesser then the country median in any given year. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table 4: Environmental Impact and Local Beliefs

Personal harm	climate denier state	climate believer state	climate denier state	climate believer state
	(1)	(2)	(3)	(4)
total impact	-0.110	0.973***		
	(0.282)	(0.253)		
direct impact			-0.121	0.885***
			(0.298)	(0.290)
N	1369	3650	1369	3650
R^2	0.65	0.55	0.65	0.54
Lender × Year FE	Y	Y	Y	Y
State FE	N	N	N	N
Sector FE	Y	Y	Y	Y
Borrower controls	Y	Y	Y	Y
Deal controls	Y	Y	Y	Y
Personal experience	climate denier state	climate believer state	climate denier state	climate believer state
	(1)	(2)	(3)	(4)
total impact	-0.0911	0.883***		
	(0.248)	(0.275)		
direct impact			-0.261	0.848***
			(0.249)	(0.324)
No. obs.	1536	3473	1536	3473
R-squared	0.63	0.56	0.63	0.56
Lender × Year FE	Y	Y	Y	Y
State FE	N	N	N	N
Sector FE	Y	Y	Y	Y
Borrower controls	Y	Y	Y	Y
Deal controls	Y	Y	Y	Y
Biodiversity harm	biodiversity insensitive	biodiversity sensitive	biodiversity insensitive	biodiversity sensitive
	(1)	(2)	(3)	(4)
total impact	5.473***	-1.961***		
	(0.600)	(0.242)		
direct impact			5.615***	-2.418***
			(0.578)	(0.192)
No. obs.	634	1360	634	1360
R-squared	0.75	0.57	0.75	0.58
Lender × Year FE	Y	Y	Y	Y
State FE	N	N	N	N
Sector FE	Y	Y	Y	Y
Borrower controls	Y	Y	Y	Y
Deal controls	Y	Y	Y	Y

This table studies the sensitivity of the loan rates to the environmental impact of the borrowers across U.S. states with different environmental beliefs. In Columns 1-4 (5-8), green is one if the borrower operates in a state with an above-country-median percentage of individuals who think that global warming will harm them personally (or who agree that they personally experienced it). The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), log(cash) and ebitda/assets. Deal controls include deal size and maturity, secured and covenant status, and non-bank participation. Standard errors correct for clustering at the lender-level and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table 5: Shocks to Local Beliefs

	(1)	(2)	(3)	(4)	(5)	(6)
total impact	0.317**	0.534***	0.308**	-0.005	0.307**	0.027
	(2.49)	(3.88)	(2.38)	(-0.04)	(2.24)	(0.20)
abnormal weather	-0.180	-2.073***	-2.299***			
	(-0.81)	(-6.23)	(-8.94)			
total impact × abnormal weather	0.047*	0.051**	0.066***			
	(1.82)	(2.32)	(2.88)			
𝟙 abnormal weather				-3.152	-9.801***	-8.761***
				(-1.60)	(-3.43)	(-3.59)
total impact × 𝟙 abnormal weather				0.620***	0.495***	0.640***
				(4.22)	(3.20)	(3.86)
No. obs.	31652	8658	9191	31833	8710	9241
R-squared	0.21	0.43	0.44	0.21	0.43	0.43
Lender FE	Y	Y	Y	Y	Y	Y
Year FE	N	N	N	N	N	N
State FE	N	N	N	N	N	N
Sector FE	Y	Y	Y	Y	Y	Y
Borrower controls	N	Y	Y	N	Y	Y
Deal controls	N	N	Y	N	N	Y

This table studies the differential sensitivity of the loan rates to the environmental impact of the borrowers during abnormal temperatures. Abnormal temperature is the abnormal temperature reported by NOAA in that month of the year based on the average temperatures in that state during 1901-2000. temperature is the monthly average temperature in F° seen in the state at the time of loan origination. 𝟙 abnormal weather takes one if the temperature anomaly is positive and zero otherwise. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), and ebitda/assets. The lender controls include log(assets), capitalization, and return on assets. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table 6: Decomposing Local Beliefs

	(1)	(2)	(3)	(4)	(5)	(6)
total impact	-0.035	-0.135	-0.622	-1.971***	-0.794	-1.962***
	(-0.23)	(-1.00)	(-1.43)	(-4.63)	(-1.31)	(-3.72)
Democrat - Republican (%)	-3.552	-2.963			-3.716	-1.009
	(-0.86)	(-0.48)			(-0.89)	(-0.17)
total impact × Democrat - Republican (%)	1.326**	0.430			1.253**	0.112
	(2.26)	(0.57)			(2.07)	(0.15)
abnormal weather		-2.675***		-1.690		0.989
		(-7.04)		(-1.37)		(0.74)
total impact × abnormal weather		0.045		0.532***		0.088
		(1.41)		(3.27)		(0.46)
abnormal weather × Democrat - Republican (%)		-1.339				-1.775
		(-0.87)				(-1.19)
total impact × abnormal weather × Democrat - Republican (%)		0.297**				0.272**
		(2.32)				(2.41)
physical risk (%)			-1.790	1.709	-1.584	6.420
			(-0.37)	(0.26)	(-0.26)	(0.86)
total impact × physical risk (%)			1.448**	2.999***	0.984	2.458***
			(2.49)	(5.19)	(1.13)	(3.32)
abnormal weather × physical risk (%)				-1.046		-5.240***
				(-0.61)		(-2.83)
total impact × abnormal weather × physical risk (%)				-0.597***		-0.0750
				(-3.09)		(-0.32)
No. obs.	5847	6327	8639	9191	5847	6327
R-squared	0.60	0.45	0.57	0.44	0.60	0.46
Lender FE	N	Y	N	Y	N	Y
Year FE	N	N	N	N	N	N
Lender × Year FE	Y	N	Y	N	Y	N
State FE	N	N	N	N	N	N
Sector FE	Y	Y	Y	Y	Y	Y
Borrower controls	Y	Y	Y	Y	Y	Y
Deal controls	Y	Y	Y	Y	Y	Y

This table studies the differential sensitivity of the loan rates to the environmental impact of the borrowers during abnormal temperatures by the extent of physical and regulatory risk. Abnormal temperature is the abnormal temperature reported by NOAA in that month of the year based on the average temperatures in that state during 1901-2000. temperature is the monthly average temperature in F° seen in the state at the time of loan origination. Democrat - Republican share is the % share of Democrats versus the Republicans in the state of the borrower. Physical risk is the % score for the physical risk of the borrower's state. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), and EBITDA/assets. The lender controls include log(assets), capitalization, and return on assets. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table 7: Environmental Impact and Biodiversity Risk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
total impact	0.128	0.275**	0.258**	0.264**				
	(0.207)	(0.116)	(0.117)	(0.116)				
biodiversity risk	0.292***				0.302***			
	(0.104)				(0.101)			
total impact × biodiversity risk	0.0147*							
	(0.00783)							
count		33.98***				36.68***		
		(11.89)				(10.66)		
total impact × count		-3.026**						
		(1.273)						
regulation			12.13				12.45**	
			(9.175)				(6.092)	
total impact × regulation			-3.659***					
			(1.234)					
negative				20.34***				26.45***
				(6.134)				(7.776)
total impact × negative				-3.492**				
				(6.134)				
direct impact					-0.00263	0.553***	0.546***	0.548***
					(0.243)	(0.138)	(0.138)	(0.138)
direct impact × biodiversity risk					0.0215**			
					(0.00939)			
direct impact × count						-8.833***		
						(1.569)		
direct impact × regulation							-6.776***	
							(1.121)	
direct impact × negative								-13.02***
								(1.894)
No. obs.	8639	8638	8638	8638	8639	8690	8690	8690
R-squared	0.57	0.60	0.60	0.60	0.57	0.57	0.57	0.57
Lender × Year FE	Y	Y	Y	Y	Y	Y	Y	Y
State FE	N	Y	Y	Y	N	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y	Y	Y
Borrower controls	Y	Y	Y	Y	Y	Y	Y	Y
Deal controls	Y	Y	Y	Y	Y	Y	Y	Y

This table investigates whether biodiversity risk may affect or determine the sensitivity of loan rates to the environmental impact of the borrowers. Biodiversity risk is the rank of the borrower state in the Nature Serve on the basis of the extinction risk of its local biodiversity. Count, regulation, and negative are the bio-diversity measures from Giglio et al. (2023). Count is an indicator variable that takes one if the firm has mentioned biodiversity at least twice in its 10-K statements, and regulation is one if at least one of these sentences is about regulation, and zero otherwise. Negative is the number of negative biodiversity sentences minus the number of positive biodiversity sentences in the 10-K filings. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), log(cash) and ebitda/assets. Deal controls include deal size and maturity, secured and covenant status, and non-bank participation. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table 8: Sensitivity of Loan Rates to Biodiversity Risk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
count	0.340						
	(5.068)						
regulation		-1.838					
		(5.588)					
negative			9.999**				
			(4.954)				
employment biodiversity state				-3.009			
				(1.961)			
gdp biodiversity state					-1.448*		
					(0.834)		
area biodiversity state						38.701	
						(23.693)	
species biodiversity state							88.689**
							(43.501)
No. obs.	20325	20325	20325	31738	31773	31772	31734
R-squared	0.57	0.57	0.57	0.54	0.54	0.54	0.54
Lender × Year FE	Y	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	N	N	N	N
Sector FE	Y	Y	Y	Y	Y	Y	Y
Borrower controls	Y	Y	Y	Y	Y	Y	Y
Deal controls	Y	Y	Y	Y	Y	Y	Y

This table studies the impact of biodiversity risk exposure on the loan rates using a variety of firm-level and regional biodiversity risk measures (Giglio et al. (2023)). The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), log(cash) and ebitda/assets. Deal controls include deal size and maturity, the secured and covenant status, and non-bank participation. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table 9: Attention to Biodiversity Risk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
high attention	-6.398***	-6.124***	-6.499***	-55.598**	-39.448**	-2.746	3.652
	(2.000)	(1.937)	(1.915)	(26.791)	(17.126)	(2.370)	(3.825)
count × high attention	19.124**						
	(8.835)						
count	-7.437						
	(6.050)						
regulation × high attention		20.686*					
		(10.681)					
regulation		-10.151					
		(7.805)					
negative × high attention			24.432***				
			(7.460)				
negative			-2.267				
			(6.790)				
employment biodiversity state × high attention				4.640*			
				(2.381)			
employment biodiversity state				-4.113*			
				(2.204)			
gdp biodiversity state × high attention					2.671**		
					(1.265)		
gdp biodiversity state					-2.183**		
					(1.037)		
area biodiversity state × high attention						-15.962	
						(34.781)	
area biodiversity state						52.305*	
						(30.468)	
species biodiversity state × high attention							-129.896*
							(69.347)
species biodiversity state							-129.896*
							(69.347)
No. obs.	21329	21329	21329	32561	32595	32590	32557
R-squared	0.53	0.53	0.54	0.52	0.52	0.52	0.52
Lender FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y	Y
Borrower controls	Y	Y	Y	Y	Y	Y	Y
Deal controls	Y	Y	Y	Y	Y	Y	Y

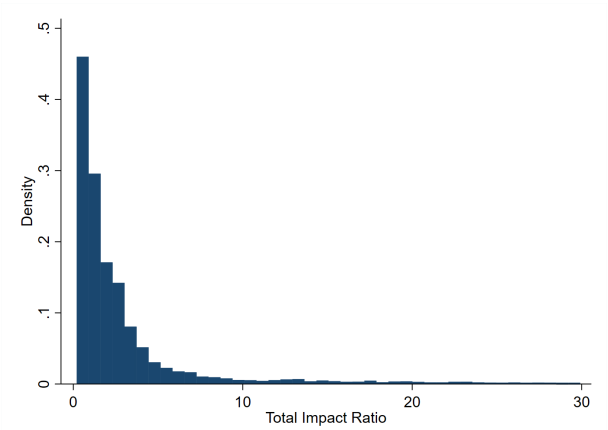
This table investigates the role of public attention on the sensitivity of the loan rates to the environmental impact of the borrowers. The bio-diversity measures are obtained from Giglio et al. (2023). The bottom of the table provides information about fixed effects, and the level of clustering. The borrower controls include log(assets), log(total debt), log(cash) and ebitda/assets. Deal controls include deal size and maturity, the secured and covenant status, and non-bank participation. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table 10: Trump Withdrawal from Paris

	(1)	(2)	(3)	(4)
total impact	0.431***	0.392***	1.113***	1.132***
	(0.153)	(0.132)	(0.193)	(0.194)
deregulation	-11.55***	-12.85***	-12.45**	-8.329
	(4.442)	(4.632)	(5.071)	(5.264)
total impact × deregulation	2.634***	2.536***	1.320**	0.573
	(0.741)	(0.631)	(0.623)	(0.465)
no-lawsuit-state	-1.884			
	(2.198)			
deregulation × no-lawsuit-state	28.69***			
	(4.911)			
total impact × no-lawsuit-state	0.253			
	(0.219)			
total impact × deregulation × no-lawsuit-state	-4.913***			
	(0.719)			
republican-state		-9.529***		
		(3.015)		
deregulation × republican-state		38.98***		
		(5.877)		
total impact × republican state		0.455**		
		(0.212)		
total impact × deregulation × republican state		-5.373***		
		(0.568)		
climate denier (personal harm)			-1.367	
			(3.059)	
deregulation × climate denier (personal harm)			16.06**	
			(7.685)	
total impact × climate denier (personal harm)			-0.677***	
			(0.254)	
total impact × deregulation × climate denier (personal harm)			-3.353***	
			(0.826)	
climate denier (personal experience)				5.199*
				(2.941)
deregulation × climate denier (personal experience)				7.640
				(7.015)
total impact × climate denier (personal experience)				-0.518**
				(0.258)
total impact × deregulation × climate denier (personal experience)				-2.548***
				(0.624)
No. obs.	8690	8690	5261	5261
R-squared	0.57	0.57	0.51	0.51
Lender × Year FE	Y	Y	Y	Y
State FE	N	N	N	N
Sector FE	Y	Y	Y	Y
Borrower controls	Y	Y	Y	Y
Deal controls	Y	Y	Y	Y

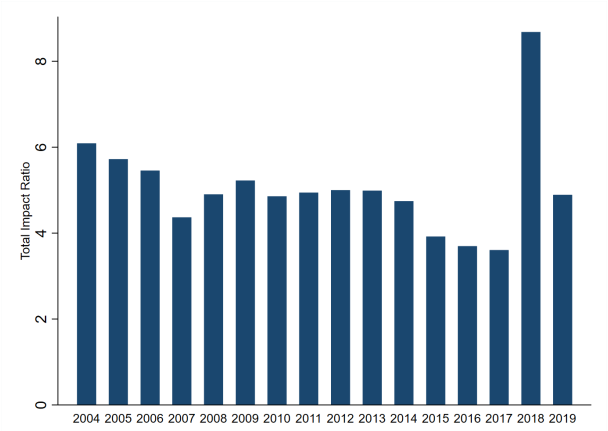
This table studies the impact of the Trump withdrawal on the sensitivity of loan rates to environmental damage. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), and ebitda/assets. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Figure 1: Total Environmental Impact as a Percentage of Revenue (%)



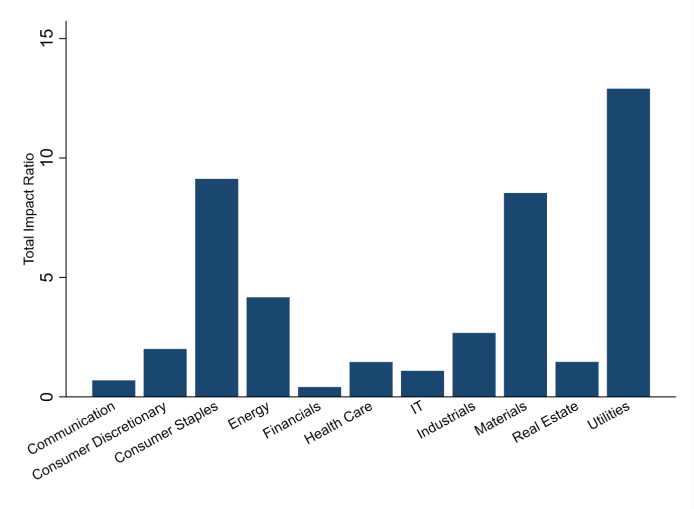
The graph displays the distribution of the environmental impact of the U.S. firms based on the Trucost total environmental impact measure.

Figure 2: The Yearly Average Total Environmental Impact

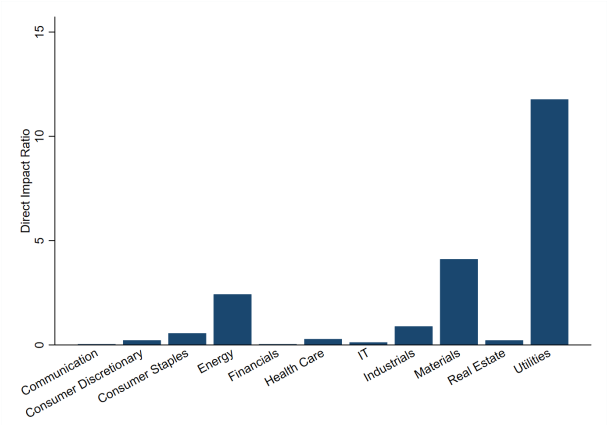


The graph presents the yearly average of the total environmental impact of the U.S. firms during the sample period 2004-2019.

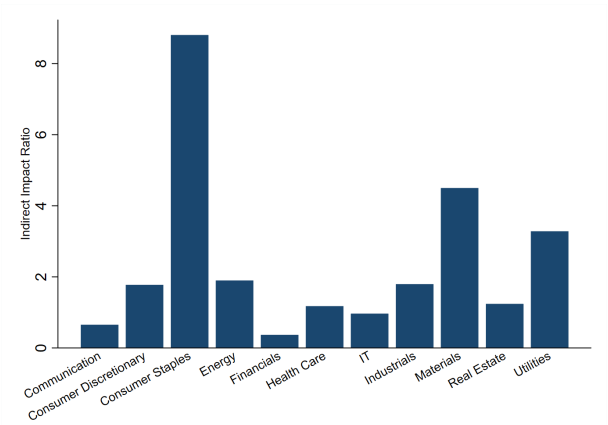
Figure 3: Impact Ratios by Different Sectors



(a) Total Environmental Impact as a percentage of revenue (%)



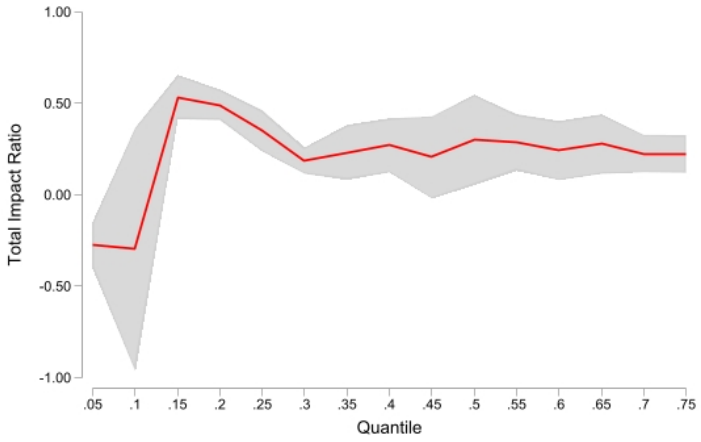
(b) Direct Environmental Impact as a percentage of revenue (%)



(c) Indirect Environmental Impact as a percentage of revenue (%)

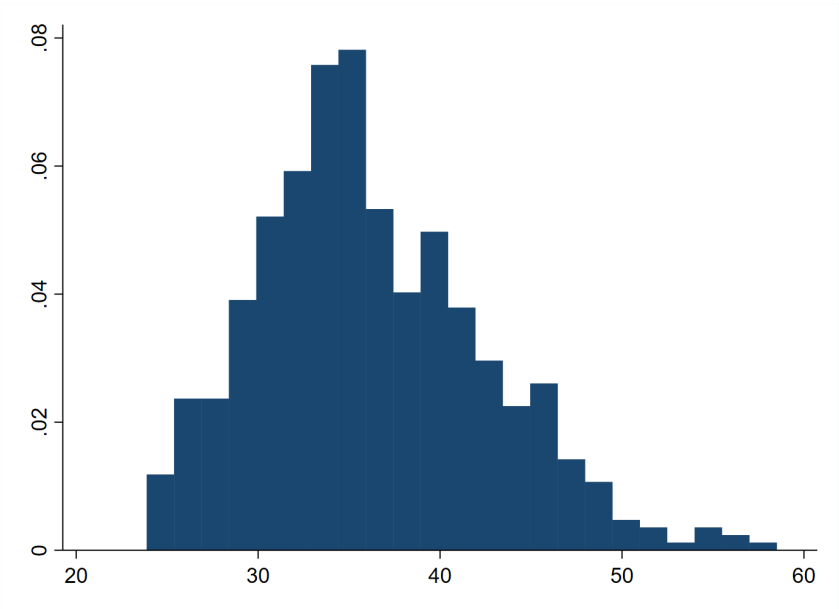
This graph presents the total, direct, and indirect impact ratios for different sectors during our sample period 2004-2019.

Figure 4: Lender Sensitivity to Total Environmental Impact



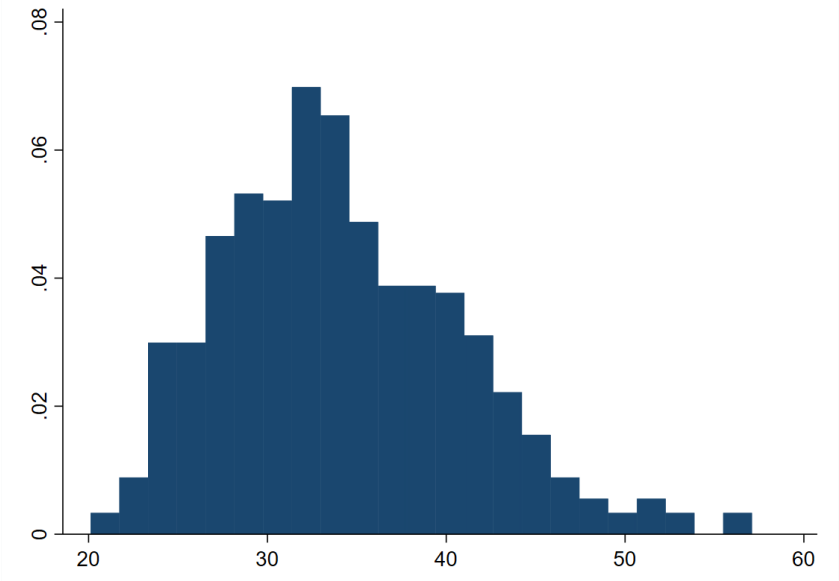
The graph represents the sensitivity of loan rates to the environmental impact of the borrowers with quantile regressions.

Figure 5: Distribution of Climate Change Denial across the U.S. States



(a) Distribution of climate change denial based on personal harm

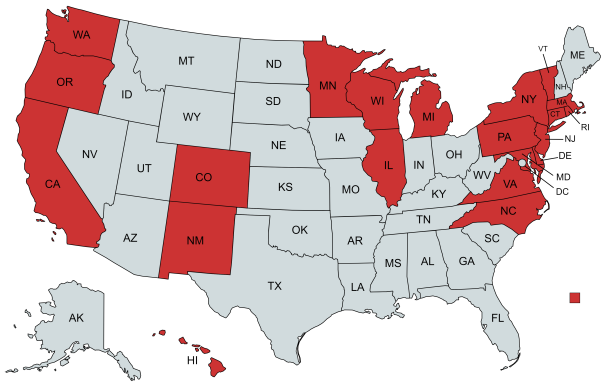
This graph presents the average estimated percentage who think global warming will harm them personally a moderate amount/a great deal in the Yale Climate Opinion Survey



(b) Distribution of Climate Change Denial based on Personal Experience

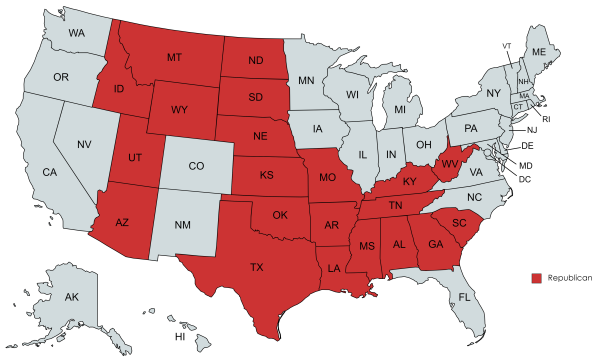
This graph presents the average estimated percentage who somewhat/strongly agree that they have personally experienced the effects of global warming in the Yale Climate Opinion Survey

Figure 6: States that are Climate Change Deniers and Trump Challengers



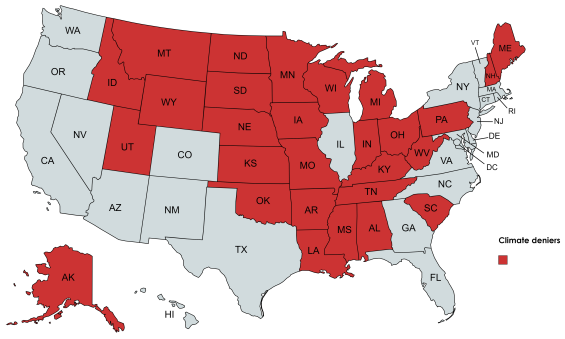
(a) States that challenged the Trump-era Environmental Deregulation

This graph presents the states that appealed the Trump withdrawal from the Paris Agreement and sued the government in the court



(b) Republican States

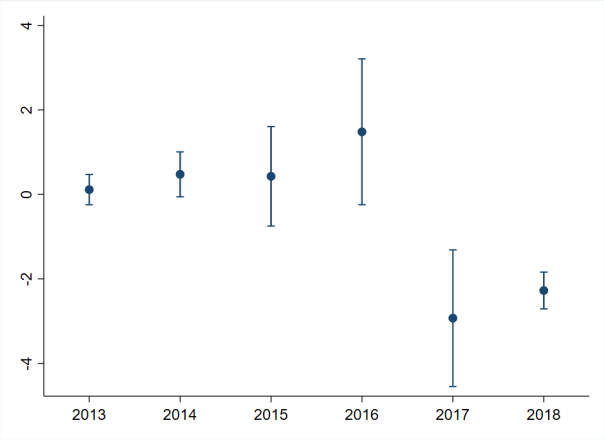
This graph presents the states that have consistently voted as Republican in our sample period



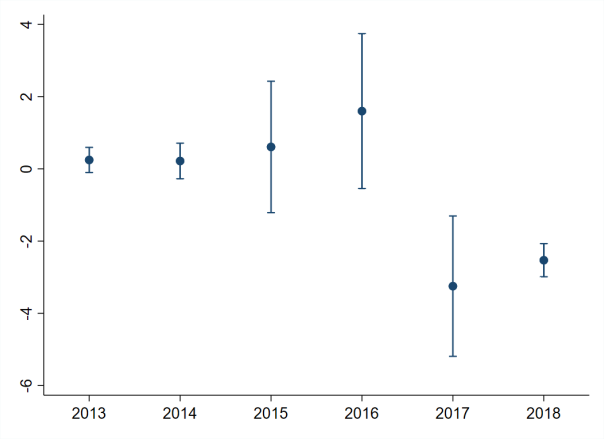
(c) States classified as Climate Deniers based on Personal Harm

This graph presents the states that are classified as climate deniers based on personal harm, *i.e.* with a lower proportion of the public who believes that global warming will harm them personally than the country median in 2016

Figure 7: Paris Withdrawal Dynamic Effects



This graph presents the dynamic regression coefficients λ_{year} from the augmented specification $\textit{Loan Rate}_{ijt} = \beta \times \textit{Impact}_{ijt} + \sum_{year} \delta_{year} \times \textit{no-lawsuit-state} \times I_{year} + \sum_{year} \lambda_{year} \times \textit{Impact}_{ijt} \times \textit{no-lawsuit-state} \times I_{year} + \alpha \times X_{it-1} + \gamma \times Z_{ijt} + \eta_{j \times t} + \epsilon_{ijt}$ where the year ranges from 2013 to 2018.



This graph presents the regression coefficients λ_{year} from the augmented specification $\textit{Loan Rate}_{ijt} = \beta \times \textit{Impact}_{ijt} + \sum_{year} \delta_{year} \times \textit{republican-state} \times I_{year} + \sum_{year} \lambda_{year} \times \textit{Impact}_{ijt} \times \textit{republican-state} \times I_{year} + \alpha \times X_{it-1} + \gamma \times Z_{ijt} + \eta_{j \times t} + \epsilon_{ijt}$ where the year ranges from 2013 to 2018.

References

Antoniou, F., Delis, M. D., Ongena, S., and Tsoumas, C. (2020). Pollution permits and financing costs. *Swiss Finance Institute Research Paper*, (20-117).

Ardia, D., Bluteau, K., Boudt, K., and Inghelbrecht, K. (2023). Climate change concerns and the performance of green vs. brown stocks. *Management Science*, 69(12):7607–7632.

Baldauf, M., Garlappi, L., and Yannelis, C. (2020). Does climate change affect real estate prices? Only if you believe in it. *The Review of Financial Studies*, 33(3):1256–1295.

Bartram, S. M., Hou, K., and Kim, S. (2022). Real effects of climate policy: Financial constraints and spillovers. *Journal of Financial Economics*, 143(2):668–696.

Berg, T., Saunders, A., and Steffen, S. (2016). The total cost of corporate borrowing in the loan market: Don't ignore the fees. *The Journal of Finance*, 71(3):1357–1392.

Bolton, P. and Kacperczyk, M. (2021a). Do investors care about carbon risk? *Journal of Financial Economics*, 142(2):517–549.

Bolton, P. and Kacperczyk, M. (2021b). Global pricing of carbon-transition risk. Technical report, National Bureau of Economic Research Working Paper 28510.

Boot, A. W., Greenbaum, S. I., and Thakor, A. V. (1993). Reputation and discretion in financial contracting. *The American Economic Review*, 83(5):1165–1183.

Carey, M. and Nini, G. (2007). Is the corporate loan market globally integrated? A pricing puzzle. *The Journal of Finance*, 62(6):2969–3007.

Chava, S. and Roberts, M. R. (2008). How does financing impact investment? The role of debt covenants. *The Journal of Finance*, 63(5):2085–2121.

Choi, D., Gao, Z., and Jiang, W. (2020). Attention to global warming. *The Review of Financial Studies*, 33(3):1112–1145.

Currie, J., Voorheis, J., and Walker, R. (2023). What caused racial disparities in particulate exposure to fall? new evidence from the clean air act and satellite-based measures of air quality. *American Economic Review*, 113(1):71–97.

Degryse, H., Goncharenko, R., Theunisz, C., and Vadasz, T. (2023). When green meets green. *Journal of Corporate Finance*, 78:102355.

Delis, M. D., De Greiff, K., and Ongena, S. (2024). Being stranded with fossil fuel reserves? Climate policy risk and the pricing of bank loans. *Financial Markets, Institutions & Instruments*, (231).

Di Giuli, A. and Kostovetsky, L. (2014). Are red or blue companies more likely to go green? politics and corporate social responsibility. *Journal of financial economics*, 111(1):158–180.

Diamond, D. W. and Rajan, R. G. (2000). A theory of bank capital. *The Journal of Finance*, 55(6):2431–2465.

Dursun-de Neef, Ö. and Ongena, S. (2023). Climate change and bank deposits. Technical report, November, CEPR Discussion Paper 18619.

Erten, I. (2022). The shadow disintermediation and cost of risk-sensitive capital. *WBS Finance Group Research Paper Forthcoming*.

Firpo, S., Fortin, N. M., and Lemieux, T. (2009). Unconditional quantile regressions. *Econometrica*, 77(3):953–973.

Flammer, C., Giroux, T., and Heal, G. (2023). Biodiversity finance. Technical report, National Bureau of Economic Research Working Paper 31022.

Froot, K. A. and Stein, J. C. (1998). Risk management, capital budgeting, and capital structure policy for financial institutions: an integrated approach. *Journal of Financial Economics*, 47(1):55–82.

Garel, A., Romec, A., Sautner, Z., and Wagner, A. F. (2023). Do investors care about biodiversity? *Forthcoming in Review of Finance*, (23-24).

Giannetti, M., Jasova, M., Loumioti, M., and Mendicino, C. (2023). "glossy green" banks: the disconnect between environmental disclosures and lending activities. *Banks: The Disconnect between Environmental Disclosures and Lending Activities (December, 2023). ECB Working Paper*, (2023/2882).

Giglio, S., Kuchler, T., Stroebel, J., and Zeng, X. (2023). Biodiversity risk. Technical report, National Bureau of Economic Research Working Paper 31137.

Guber, D. L. (2013). A cooling climate for change? party polarization and the politics of global warming. *American Behavioral Scientist*, 57(1):93–115.

Hubbard, R. G., Kuttner, K. N., and Palia, D. N. (2002). Are there bank effects in borrowers' costs of funds? Evidence from a matched sample of borrowers and banks. *The Journal of Business*, 75(4):559–581.

Huber, R. A. (2020). The role of populist attitudes in explaining climate change skepticism and support for environmental protection. *Environmental Politics*, 29(6):959–982.

Irani, R. M., Iyer, R., Meisenzahl, R. R., and Peydro, J.-L. (2021). The rise of shadow banking: Evidence from capital regulation. *The Review of Financial Studies*, 34(5):2181–2235.

Ivanov, I., Kruttli, M. S., and Watugala, S. W. (2023). Banking on carbon: Corporate lending and cap-and-trade policy. *Available at SSRN 3650447*.

Ivashina, V. (2009). Asymmetric information effects on loan spreads. *Journal of Financial Economics*, 92(2):300–319.

Kacperczyk, M. T. and Peydró, J.-L. (2022). Carbon emissions and the bank-lending channel. *Available at SSRN 3915486*.

Koenker, R. and Bassett Jr, G. (1982). Robust tests for heteroscedasticity based on regression quantiles. *Econometrica: Journal of the Econometric Society*, pages 43–61.

Krueger, P., Sautner, Z., and Starks, L. T. (2020). The importance of climate risks for institutional investors. *The Review of Financial Studies*, 33(3):1067–1111.

Li, Q., Shan, H., Tang, Y., and Yao, V. (2024). Corporate climate risk: Measurements and responses. *The Review of Financial Studies*, 37(6):1778–1830.

Lim, J., Minton, B. A., and Weisbach, M. S. (2014). Syndicated loan spreads and the composition of the syndicate. *Journal of Financial Economics*, 111(1):45–69.

Mattes, J. A., Steffen, S., and Wahrenburg, M. (2013). Do information rents in loan spreads persist over the business cycles?. *The Journal of Financial Services Research*, 43:175–195.

Neumayer, E. (2004). The environment, left-wing political orientation and ecological economics. *Ecological economics*, 51(3-4):167–175.

Pan, Y., Pikulina, E., Siegel, S., and Wang, T. Y. (2024). Political divide and the composition of households' equity portfolios. *Available at SSRN 4381330*.

Pástor, L., Stambaugh, R. F., and Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of financial economics*, 142(2):550–571.

Santos, J. A. and Winton, A. (2019). Bank capital, borrower power, and loan rates. *The Review of Financial Studies*, 32(11):4501–4541.

Sufi, A. (2007). Information asymmetry and financing arrangements: Evidence from syndicated loans. *The Journal of Finance*, 62(2):629–668.

van der Ploeg, F. and Rezai, A. (2019). The agnostic's response to climate deniers: Price carbon! *European Economic Review*, 111:70–84.

Zhou, M. (2015). Public environmental skepticism: A cross-national and multilevel analysis. *International Sociology*, 30(1):61–85.

Appendix to Do banks price environmental risk? Only when local beliefs are binding!

Irem Erten Warwick Business School, University of Warwick, Steven Ongena University of Zurich, Swiss Finance Institute, KU Leuven, NTNU Business School, CEPR.

Table 1: Sensitivity of Loan Rates to Different Types of Environmental Impact

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
natural resources	5.110***	4.128***	2.462***						
	(0.471)	(0.706)	(0.624)						
water				0.294	1.723***	1.440**			
				(0.358)	(0.527)	(0.580)			
land and water							-2.731	16.25***	23.25***
							(2.342)	(5.760)	(5.037)
N	31055	8658	8638	31055	8658	8638	31055	8658	8638
R^2	0.40	0.47	0.60	0.39	0.47	0.60	0.39	0.47	0.60
Lender × Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Borrower controls	N	Y	Y	N	Y	Y	N	Y	Y
Deal controls	N	N	Y	N	N	Y	N	N	Y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
air pollutants	-0.385	-1.202	-0.948						
	(1.115)	(1.859)	(1.225)						
ghg emissions				0.979***	0.839	0.492			
				(0.325)	(0.513)	(0.299)			
waste							-19.53***	-27.88***	-20.70***
							(2.725)	(6.046)	(4.794)
No. obs.	31055	8658	8638	31055	8658	8638	31055	8658	8638
R-squared	0.39	0.46	0.60	0.39	0.46	0.60	0.40	0.47	0.60
Lender × Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Borrower controls	N	Y	Y	N	Y	Y	N	Y	Y
Deal controls	N	N	Y	N	N	Y	N	N	Y

This table reports the sensitivity of the loan rates to the different types of environmental impact of the borrowers at the loan facility level. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), log(cash) and ebitda/assets. Deal controls include deal size and maturity, the secured and covenant status, and non-bank participation. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table A2: States and Cities that Sued the Trump Government for the Paris Agreement Withdrawal

New York
California
Colorado
Connecticut
Delaware
Hawaii
Illinois
Maine
Maryland
Massachusetts
Michigan
Minnesota
New Jersey
New Mexico
North Carolina
Oregon
Pennsylvania
Rhode Island
Vermont
Virginia
Washington
Wisconsin
Washington, D.C.
Boulder
Los Angeles
Chicago
New York
Philadelphia
South Miami

This table reports the states and cities that sued the Trump government in the District of Columbia Circuit after the Paris Agreement withdrawal.

Table A3: Republican States

Alabama
Arizona
Arkansas
Georgia
Idaho
Kansas
Kentucky
Louisiana
Missouri
Mississippi
Montana
Nebraska
North Dakota
Oklahoma
South Carolina
South Dakota
Tennessee
Texas
Utah
West Virginia
Wyoming

This table presents the states that consistently voted for the Republican party in the presidential elections during the sample period.

Table A4: Environmental Impact and Lender Capitalization: Skin-in-the-game

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
total impact	-0.0251	-0.0596*	-0.0671**						
	(0.0219)	(0.0355)	(0.0293)						
direct impact				-0.0517**	-0.0786**	-0.0910***			
				(0.0218)	(0.0390)	(0.0293)			
indirect impact							-0.0335	0.137	0.227
							(0.0650)	(0.211)	(0.188)
No. obs.	7047	1638	1637	7047	1638	1637	7047	1638	1637
R-squared	0.31	0.41	0.56	0.31	0.41	0.56	0.30	0.41	0.55
Lender × Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Borrower controls	N	Y	Y	N	Y	Y	N	Y	Y
Deal controls	N	N	Y	N	N	Y	N	N	Y

This table reports the sensitivity of the lead arranger shares to the environmental impact of the borrowers. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), log(cash) and ebitda/assets. Deal controls include deal size and maturity, secured and covenant status, and non-bank participation. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table A5: Local Belief Shocks: Abnormal Temperatures

	(1)	(2)	(3)	(4)	(5)	(6)
total impact	0.468	-0.580	-0.590	0.534***	0.312*	0.0986
	(0.466)	(0.495)	(0.399)	(0.124)	(0.167)	(0.129)
temperature (F°)	0.0947	-0.0953	-0.106			
	(0.0652)	(0.110)	(0.0875)			
total impact × temperature (F°)	0.00138	0.0173**	0.0140**			
	(0.00775)	(0.00751)	(0.00654)			
𝟙 extreme temperature				4.569**	2.298	-0.0965
				(2.152)	(3.189)	(2.469)
total impact × 𝟙 extreme temperature				0.0854	0.575**	0.592**
				(0.215)	(0.271)	(0.248)
No. obs.	31040	8658	8638	31055	8658	8638
R-squared	0.40	0.47	0.60	0.40	0.47	0.60
Lender × Year FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y
Borrower controls	Y	Y	Y	Y	Y	Y
Deal controls	N	Y	N	Y	N	Y

This table studies the differential sensitivity of the loan rates to the environmental impact of the borrowers during temperature fluctuations. Temperature is the monthly average temperature in F° seen in the state at the time of loan origination. The bottom of the table provides information about fixed effects. 𝟙 extreme temperature takes one if the absolute value of the temperature is in the upper 25% relative to the state average seen in the sample period. The borrower controls include log(assets), log(total debt), and ebitda/assets. The lender controls include log(assets), capitalization, and return on assets. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table A6: Trump Withdrawal from Paris: Natural Resources, Land, and Water

	(1)	(2)	(3)
deregulation	-1.396	-6.717	-5.289
	(4.758)	(4.704)	(4.883)
no-lawsuit-state	-0.248	-5.899***	-7.820***
	(2.275)	(2.268)	(2.812)
deregulation × no-lawsuit-state	12.17**	17.74***	17.11***
	(5.641)	(5.780)	(5.610)
natural resources	2.967***		
	(0.697)		
natural resources × deregulation	-5.219***		
	(1.203)		
natural resources × no-lawsuit-state	1.475		
	(1.191)		
natural resources × deregulation × no-lawsuit-state	-6.583		
	(6.722)		
water		-1.431***	
		(0.493)	
water × deregulation		4.030***	
		(0.801)	
water × no-lawsuit-state		5.543***	
		(1.261)	
water × deregulation × no-lawsuit-state		-3.887	
		(4.454)	
land and water			-3.814
			(3.754)
land and water × deregulation			16.04***
			(3.717)
land and water × no-lawsuit-state			42.00***
			(12.12)
land and water × deregulation × no-lawsuit-state			-23.97**
			(10.38)
No. obs.	8690	8690	8690
R-squared	0.57	0.57	0.58
Lender × Year FE	Y	Y	Y
State FE	N	N	N
Sector FE	Y	Y	Y
Borrower controls	Y	Y	Y
Deal controls	Y	Y	Y

This table studies the impact of the Trump withdrawal on the sensitivity of loan rates to environmental damage. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), and ebitda/assets. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table A7: Trump Withdrawal from Paris: Emissions and Waste

	(1)	(2)	(3)
deregulation	-12.08***	-18.15***	-1.245
	(4.123)	(5.149)	(5.586)
no-lawsuit-state	4.716	1.833	0.215
	(3.135)	(2.353)	(2.801)
deregulation × no-lawsuit-state	27.13***	29.04***	15.14***
	(6.654)	(5.446)	(5.537)
air pollutants	3.207		
	(2.152)		
air pollutants × deregulation	-5.905**		
	(2.603)		
air pollutants × no-lawsuit-state	-5.878***		
	(2.153)		
air pollutants × deregulation × no-lawsuit-state	-8.303***		
	(2.808)		
ghg emissions		0.975**	
		(0.401)	
ghg emissions × deregulation		13.51***	
		(3.207)	
ghg emissions × no-lawsuit-state		-0.701*	
		(0.421)	
ghg emissions × deregulation × no-lawsuit-state		-16.03***	
		(3.130)	
waste			0.351
			(7.106)
waste × deregulation			-13.47
			(28.27)
waste × no-lawsuit-state			-1.247
			(7.422)
waste × deregulation × no-lawsuit-state			-15.21
			(28.65)
No. obs.	5261	8690	8690
R-squared	0.51	0.57	0.57
Lender × Year FE	Y	Y	Y
State FE	N	N	N
Sector FE	Y	Y	Y
Borrower controls	Y	Y	Y
Deal controls	Y	Y	Y

This table studies the impact of the Trump withdrawal on the sensitivity of loan rates to environmental damage in the form of toxic emissions and waste. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), and ebitda/assets. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.

Table A8: Local Belief Shocks (Lender)

	(1)	(2)	(3)	(4)	(5)	(6)
total impact	0.241	0.999***	0.712**	-0.507***	-0.059	-0.065
	(0.184)	(0.280)	(0.322)	(0.186)	(0.268)	(0.173)
abnormal weather	-0.217	0.389	0.536			
	(0.675)	(1.118)	(0.947)			
total impact × abnormal weather	0.082***	0.078*	0.036			
	(0.028)	(0.038)	(0.048)			
𝟙 abnormal weather				-1.504	-0.009	-1.014
				(4.370)	(4.404)	(3.894)
total impact × 𝟙 abnormal weather				0.871***	0.959***	0.621***
				(0.208)	(0.228)	(0.153)
No. obs.	6205	1789	1785	19393	5689	5671
R-squared	0.147	0.158	0.305	0.199	0.226	0.402
Lender FE	Y	Y	Y	Y	Y	Y
State FE	N	N	N	N	N	N
Sector FE	Y	Y	Y	Y	Y	Y
Borrower controls	N	Y	Y	N	Y	Y
Deal controls	N	N	Y	N	N	Y

This table studies the differential sensitivity of the loan rates to the environmental impact of the borrowers during abnormal temperatures in the lender area. Abnormal temperature is the abnormal temperature reported by NOAA in that month of the year based on the average temperatures in that state during 1901-2000. temperature is the monthly average temperature in F° seen in the state of the lender at the time of loan origination. 𝟙 abnormal weather takes one if the temperature anomaly is positive and zero otherwise. The bottom of the table provides information about fixed effects. The borrower controls include log(assets), log(total debt), and EBITDA/assets. The lender controls include log(assets), capitalization, and return on assets. Standard errors correct for clustering at the lender-level, and are reported in parentheses. ***, ** and * indicate statistical difference from zero at the 1%, 5% and 10% levels, respectively.