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Carbon Transition Risk and Corporate Loan Securitization*

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Abstract

We examine how banks manage carbon transition risk by selling loans given to polluting borrowers to less regulated shadow banks in securitization markets. Exploiting the election of Donald Trump as an exogenous shock that reduces carbon risk, we find that banks' securitization decisions are sensitive to borrowers' carbon footprints. Banks are more likely to securitize brown loans when carbon risk is high but swiftly change to keep these loans on their balance sheets when carbon risk is reduced after Trump's election. Importantly, securitization enables banks to offer lower interest rates to polluting borrowers but does not affect the supply of green loans. Our findings are more pronounced among domestic banks and banks that do not display green lending preferences. We discuss how securitization can weaken the effectiveness of bank climate policies through reducing banks' incentives to price carbon risk.

Keywords: carbon transition risk, securitization, shadow banking, Trump election

JEL classification: G21, G23, G28, Q51, Q56

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"The necessary transition to a low-carbon economy entails risks for the financial system that, at present, are insufficiently understood."

Luis de Guindos (2019), Vice President of the European Central Bank (ECB)

1 Introduction

Banks play a vital role in the transition to a low-carbon economy, but they also expose themselves to carbon transition risk (De Haas, 2023). When carbon risk is rising and banks increasingly face pressure from regulators and investors to finance the green transition, one way to manage carbon risk is to sell carbon-intensive loans to less-regulated shadow banking entities. Recent discussions among regulators and financial experts have highlighted this problem, acknowledging that the opacity of shadow banks poses a significant challenge to efforts to reduce carbon emissions.[1] This challenge arises because, regulatory efforts that aim to reduce lending to carbon-intensive borrowers can be circumvented by transferring such loans to shadow banks which, in turn, has potential to undermine the effectiveness of bank climate policies.

Our paper contributes to this debate by investigating whether banks mitigate carbon risk by offloading brown loans to collateralized loan obligation (CLO) managers, who represent the largest securitizers and traders of leveraged loans in secondary markets. Data from syndicated lending markets show that banks increased their holdings of green loans in recent years. For example, in 2013, only a quarter of syndicated loans held by banks were allocated to low-carbon emitters. However, by 2019, this proportion doubled to 50%. At the same time, Figure 1 shows that more than half of the loans that banks sell in securitization markets are loans to brown industries. Moreover, CLO managers are expanding the holdings of these loans in recent years, especially after the Paris Agreement in 2015. Yet, we are still at an early stage of understanding what motivates banks to securitize loans given to polluting borrowers and its implications for the green transition.

[1] "Asset managers told to clean up greenwashing and net zero claims", the Financial Times, June 2020.

[Insert Figure 1]

Exploiting the election of President Trump in 2016 as an exogenous shock that reduces carbon transition risk, our study offers three main contributions. First, we present strong evidence that banks' securitization decisions are sensitive to borrowers' carbon footprints. Banks are generally more likely to sell loans to shadow banking entities when borrowers' carbon emissions are higher. However, after Trump's election, banks quickly adjust and keep these loans on their balance sheets when carbon transition risk is lower. Second, banks reduce the carbon premium charged on securitized loans, but securitization does not affect the supply of green loans. Finally, we show that US banks and banks that do not display preferences for green lending are more likely to use securitization to manage their carbon transition risk.

Understanding how banks actively manage carbon risk through securitization is crucial for three main reasons. First, while securitization enables banks to shift risk to loan purchasers, theories predict that it may distort lenders' monitoring incentives because banks do not have much skin in the game compared to when they hold loans on their balance sheets (Gorton and Pennacchi, 1995; Parlour and Plantin, 2008; Parlour and Winton, 2013). These theories have implications for banks' risk-pricing behavior. During the securitization process, banks earn servicing fees and income from the sales of securities, while interest rate revenue from the loans is transferred to loan purchasers. In this case, banks may have lower incentives to price the carbon transition risk into loan contracts.

Second, there have been ongoing discussions on how securitization markets could finance the green transition. For example, the European Securities and Markets Authority (ESMA) established sustainable finance priorities in 2022 and conducted several analyses on how reviving EU securitization markets could benefit the green transition. However, when banks sell brown loans in these markets, there is a risk that these loans may end up in the portfolios of less regulated shadow banks. As shadow banks operate with less scrutiny from financial regulators, regulatory initiatives aimed at decarbonizing banks' loan portfolios may not necessarily translate to broader decarbonization of the economy. Currently, the European Central Bank

(ECB) is soliciting proposals regarding green capital requirements for banks. Additionally, climate stress tests have been conducted by the ECB (2022), the Bank of France (2021), and the Dutch central bank (2020) on systemically important financial institutions. However, these efforts exclusively target banks, overlooking shadow banks, which operate beyond the the regulatory perimeter.

Third, while one may argue that banks can also shift risk through other channels, such as the use of credit derivatives, the size of corporate loan securitization markets is substantial and growing fast, having reached more than $1.3 trillion worldwide recently, making it a first-order focus of investigation. Between 2008 and 2022, CLO managers held around 50 to 75% of the assets in global leveraged loan markets. In addition, Emin et al. (2023) document that loan trading in securitization markets is much less transparent and less regulated compared to trading of other financial assets such as bonds. Thus, CLO managers, distinct from other types of non-banks in institutional loan markets, are the only ones who can provide capital arbitrage and buy loans that are less in demand.

To address our research questions, we relate banks' securitization decisions to firms' carbon emission intensity and carbon emission levels. We obtain loan-level data from Thomson Reuters LPC's DealScan, firm-level carbon emissions data from Refinitiv, and securitization information from Creditflux CLO-i. We focus exclusively on loans provided to US firms between 2013 and 2019. In the spirit of Benmelech et al. (2012) and Bozanic et al. (2018), we determine a loan's securitization status by cross-referencing its presence in both the Dealscan and Credit Flux CLO-i databases. This merging process indicates that a bank has sold the loan to a CLO manager, facilitating its trading within secondary markets.

We find strong evidence that banks consider transition risk in their securitization decisions. Between 2013 and 2019, banks are 4 percentage points (pp) more likely to securitize loans when borrower's emission intensity increases by 1 ton per thousand dollars of revenue (tCO_2/K$). Using the level of carbon emissions, we also find that banks are 2% more likely to securitize loans when the carbon emissions of borrowers increase by 1 ton.

In the next step, we exploit an exogenous shock that reduces carbon transition risk: the election of Donald Trump on November 8, 2016. The main advantage of using this event is the unexpected outcome, as President Trump won only by a small margin. Furthermore, Trump's election leads to a discontinuation of the existing trend of tightening environmental policy, as he promised to roll back these policies. In contrast, his opponent, Hillary Clinton, argued strongly for pro-climate policies. Following Ilhan et al. (2021) and Ramelli et al. (2021), we argue that Donald Trump's 2016 election and his nomination of climate skeptic Scott Pruitt to head the Environmental Protection Agency drastically lead to lower expectations about US climate policies, thus reducing carbon transition risk. A recent article from the New York Times reports that during the time of Trump's administration in office, more than 100 environmental policies were rolled back, including the Clean Power Plant and the withdrawal from the Paris Agreement.[2] Data on firms' exposure to climate transition risk by Sautner et al. (2022) and data on coverage of firms' environmental incidents from Reprisk confirm that transition risk is lower after the election of Donald Trump.

If banks view securitization as a tool to manage their exposure to firms' transition risk, a decline in this risk would lead banks to securitize fewer loans granted to high-carbon emitters. Our results support this hypothesis and show that banks quickly adapt to a lower carbon transition risk environment. After Trump's election, banks are 3.6 to 4.5 pp less likely to securitize loans given to high-carbon emitters (brown loans) compared to loans given to low-carbon emitters (non-brown loans).

As banks could also manage risk by adjusting their pricing accordingly (Chava, 2014; McGowan and Nguyen, 2023), we examine whether banks choose between risk pricing and risk shifting. We find evidence that banks do not price the carbon transition risk as much if they can securitize these loans. In particular, if a loan is securitized, banks offer between 39 basis points (bsp) and 65 bsp discount for brown loans compared to non-brown loans. One explanation could be that banks securitize brown loans and offer lower interest rates to

[2] "The Trump Administration Rolled Back More Than 100 Environmental Rules. Here is the full list", The New York Times, Jan 2021.

facilitate a green transition of these firms. We examine this question by collecting information on whether loans are granted for green or sustainable purposes. In the spirit of Carrizosa and Ghosh (2022), we classify green loans as loans containing sustainability-performance-pricing provisions. We find no evidence that securitization leads to higher green loan supply.

Further tests reveal heterogeneity in the data. We show that banks with preferences for sustainable lending are less likely to use securitization as a risk transfer vehicle. Our findings are stronger for domestic US lenders because these banks are more directly affected by changes in climate policies targeting US firms. Large banks, banks with lower level of deposits, and banks with lower capital ratios are more likely to manage carbon transition risk by securitization.

We rule out that our results are driven by confounding effects and measurement issues. For instance, our findings are unlikely to be driven by the demand of CLO managers to buy brown loans in secondary markets. We show that CLO managers do not charge carbon premia in secondary markets and prices asked by first time investors of these loans in securitization markets are not sensitive to firms' carbon footprints. Loan demand from borrowers is also not the reason why banks change securitization decisions as we observe that the demand to get new loans between high vs low carbon emitters is similar after Trump's election.

Falsification tests using quarters prior to Trump's election as shocks to carbon transition risk show that banks do not react to these falsification events. External validity tests suggest that our results are applicable beyond the US context. First, we replicate our results using data on loan securitization in the European Union (EU). To this end, we exploit the Paris Agreement of 2015 as an exogenous shock that leads to higher carbon transition risk. We find that EU banks are more likely to securitize loans given to high carbon emitters after the Paris Agreement. Second, we use an alternative approach that exploits the withdrawal of the Paris Agreement in 2017 as the turning point for lower carbon transition risk in the US and the results confirm our main findings.

Policy changes after Trump's election, such as lesser supervision and regulation for large and medium-sized banks, lower corporate taxation, or stricter trade policies, do not obscure our findings. For example, one may expect that our results are driven by large banks that are the main players in the securitization markets. These banks may have lower preferences for securitization as they do not face strict liquidity regulations as before due to Trump's banking deregulation policies. However, controlling for these factors leaves our findings unchanged.

Another concern is that firms' carbon emissions may be correlated with their credit risk and hence our findings may simply reflect the choice of banks to securitize loans based on credit risk. We alleviate this concern by collecting information on whether borrowers have credit ratings from S&P Global and constructing measures for borrowers' credit constraints using Altman's Z-score (Altman, 1968) and the Size-Age (SA) index (Hadlock and Pierce, 2010). Controlling for these measurements of firms' credit risk does not affect our results.

We also confirm that our findings are not sensitive to changes in how we measure firms' exposure to carbon transition risk. Our results remain unchanged when using ESG scores and a measure of climate regulatory risk developed by Sautner et al. (2022). Furthermore, our results are qualitatively unaffected when using a continuous measure of the intensity and level of carbon emissions.

Our paper relates to several strands of literature. First, we speak to the debate on how banks manage carbon transition risk. Recently, Thakor (2023) highlights that banks cannot hedge against carbon transition risk by just having more capital and we need to understand better how banks deal with this new emerging risk. Recent evidence suggests that banks incorporate carbon risk into their loan pricing. Firms with higher carbon emissions or fossil fuel reserves pay higher interest rates, while firms that disclose environmental information receive more favorable terms (Chava, 2014; Degryse et al., 2021; Delis et al., 2021). Furthermore, banks seem to account for transition risk in their loan volumes (Kacperczyk and Peydró, 2021; Mueller and Sfrappini, 2022; Reghezza et al., 2022). Mueller and Sfrappini (2022) show that banks lend more to companies that are likely to benefit from the introduction of environmental regulations, while Kacperczyk and Peydró (2021) find that companies with high carbon emissions receive less funding after banks commit to sustainable lending. Ivanov et al. (2021) show that carbon pricing policies lead high-emission firms not only to face higher interest rates but also to shorter loan maturities and lower access to permanent forms of bank financing. We contribute to this strand of literature by being the first to document the causal effect of carbon transition risk on banks' securitization of corporate loans. In contrast to these papers, we are the first to document how banks sell brown assets to third parties. In this sense, our paper complements the findings of Duchin et al. (2022), who focus on the asset market for industrial pollution and show that firms sell pollutive plants to buyers who do not face environmental pressure.

Second, we add to the relatively sparse literature on how banks deal with climate risk through securitization. Ouazad and Kahn (2022) illustrate that lenders are more likely to approve mortgages in areas that experienced natural disasters that can be securitized. Similarly, Nguyen et al. (2022) outline that lenders are more likely to ignore the risk of rising sea levels when affected mortgages can be securitized. Furthermore, the findings of Keenan and Bradt (2020) show that lenders reduce their exposures to climate physical risk by selling high-risk loans in secondary markets. This strand of literature so far considers only climate physical risk and the securitization of mortgages. Our work differs from these studies by focusing on the impact of carbon transition risk on corporate loan securitization.

Third, we contribute to the literature on the determinants and consequences of banks' securitization activities. Several papers model why banks sell loans on secondary markets (Gorton and Pennacchi, 1995; Pennacchi, 1988). Empirical work shows that banks sell high credit risk loans when they have to hold costly equity capital against their credit exposures (Parlour and Winton, 2013) and when loan purchasers do not price the risk correctly (McGowan and Nguyen, 2023). We depart from this literature by focusing on how banks choose to securitize loans given to high carbon emitters to manage carbon transition risk and whether securitization enables banks to offer carbon discounts for these loans.

2 Institutional background and hypothesis development

2.1 The process of corporate loan securitization

There are two major institutional investors in synicated lending markets: CLO managers with a market share of about 65% and mutual funds with a market share of 20% (Emin et al., 2023). Thus, banks can share risk in a syndicated loan by involving either CLO managers or other non-banks (mostly mutual funds) as participants. However, while mutual funds engage in liquidity transformation by investing in illiquid loans and irregularly trade these loans with other investors, CLO managers can buy loans, and securitize these loans to regularly resell in secondary markets. Given that mutual funds are much smaller players in institutional leveraged loan markets compared to CLOs and have limited scope to engage in arbitrage and risk-shifting behavior (Emin et al., 2023; Shleifer and Vishny, 1997), the focus of our paper is on the securitization of institutional loans through CLO managers.[3]

CLO managers usually acquire tranches of syndicated loans from banks and set up special-purpose vehicles to assemble a collateral portfolio of loans. They also work together with rating agencies to rate, structure, and issue securities in different tranches depending on the seniority level and riskiness of these instruments. Through the interaction in the syndication process and other related services like underwriting, lead banks, compared to other participants, have better information and access to secondary markets. As a result, they can easily sell parts of their shares to the CLO manager in the syndicate (Benmelech et al., 2012; Blickle et al., 2020; Bord and Santos, 2015; Bozanic et al., 2018; Drucker and Puri, 2009; Paligorova and Santos, 2016).

Figure 2 illustrates how corporate loan securitization works and the involvement of different parties in this market. In short, securitization of corporate loans is the process of pooling corporate loans (mostly leveraged ones) into marketable securities. As of 2019, the size of the

[3]In one of the robustness test, we empirically examine whether other types of non-banks behave similarly to CLO mangers. The results suggest that unlike CLOs managers, other types of nonbanks do not have much scope to arbitrage and banks are unable to shift carbon transition risk to non-bank non-CLO participants.

CLO markets was more than 1.3 trillion dollars, suggesting that CLO managers hold around 65% of the global leveraged loan market.

Throughout the CLO life cycle, CLO managers use interest and capital repayments received from leveraged loans to pay investors. In the securitization process, CLO managers' compensations are not strongly related to the performance of CLO deals, as they earn a fixed amount of fees, which ranges between 40 and 50 basis points per contract (Benmelech et al., 2012; Tavakoli, 2004). Therefore, CLO managers have more incentive to structure a large number of deals to earn more servicing fees, but less incentive to price the risk of the underlying assets. Previous studies also suggest that within a given rating class, CLO managers are more likely to select loans with a higher spread to earn higher fees (Cordell et al., 2023).

In the context of climate transition risk, we conjecture that banks may adjust their exposure to transition risk using securitization because CLO managers have little incentive to price transition risk into loan purchasing contracts. We later confirm these pricing incentives of CLO managers using data from Creditflux CLO-i.

2.2 Banks' management of carbon transition risk

Our objective is to investigate whether banks utilize securitization as a means of managing carbon transition risk. Existing theories offer some predictions for our prior. Under the traditional "originate-to-hold" banking business model, agency theory suggests that banks can limit their exposure through their lending activities when there is a misalignment between the risk management goals of lenders and the profit maximization goals of borrowers (Armstrong et al., 2010; Shleifer and Vishny, 1997).

In the case of carbon transition risk, lenders may have different climate-related goals than their borrowers. If there is uncertainty about climate policies and carbon transition risk, banks may expect firms to undertake actions to reduce pollutants and comply with environmental policies. In contrast, borrowers may focus on their financial performance and make business decisions, such as investing in high-profit but pollution-intensive projects (Jung et al., 2018).

These projects can be risky because they involve the externalization of pollutants that increase firms' exposure to higher carbon risk.

Agency theory predicts that if these pollution-intensive projects are successful, shareholders will benefit whereas creditors bear most of the cost if these projects fail. To avoid this issue, lenders can reduce their exposure to firms' transition risk by adjusting loan contracts accordingly. Empirical evidence consistently documents that transition risk is, at least to some degree, accounted for in banks' pricing and quantity decisions (Chava, 2014; Kacperczyk and Peydró, 2021; Mueller and Sfrappini, 2022; Ivanov et al., 2021).

However, if banks operate an "originate-to-distribute" business model, they can use securitization of loans to carbon-intensive firms as an alternative way to mitigate their exposures to transition risk rather than imposing stricter loan contracts or reducing credit supply. Contemporary theories on loan sales offer some insight into banks' securitization behaviors. Parlour and Winton (2013) suggest that capital requirements, which force lenders to hold costly equity capital against their credit exposures, lead to a benign motive that banks sell off high credit risk loans. Gorton and Pennacchi (1995) model a bank's choice between selling and holding loans and show that the moral hazard associated with loan securitization could be reduced if banks hold a certain fraction of a loan. These predictions on the determinants of loan sales have implications beyond banks' monitoring of credit risk. For instance, in the case of transition risk, banks could be more active in the securitization market to reduce their exposure to high carbon emitters.

We formulate the first hypothesis as follows:

H1: Banks are more likely to securitize loans if borrowers increase their carbon emission intensity or carbon emission level.

2.3 Trump's election and carbon transition risk

To establish a causal relationship between transition risk and corporate loan securitization, we exploit Trump's election in 2016 as an exogenous event that leads to lower carbon transition risk. Throughout the 2016 electoral campaign, Donald Trump expressed conflicting views on climate policy to his opponent, for example, by proposing to dismantle the Clean Power Plan and leave the Paris Agreement. Hilary Clinton, on the contrary, was expected to continue to tighten environmental regulations. Given that most polls predicted a victory for Clinton, Trump winning the election was a big surprise. Already a month after the election, Scott Pruitt, a climate skeptic, was appointed as the head of the Environmental Protection Agency. Within 4 years, the Trump administration dismantled more than 100 environmental regulations. Notable examples of how Trump's election affected climate policies are, among others, the withdrawal of the United States from the Paris Agreement in 2017, the easing of fuel economy standards for passenger cars and light trucks in 2018, and the replacement of the Clean Power Plan with the Affordable Clean Energy Rule in 2019.

We formally investigate changes in carbon transition risk around Trump's election by comparing climate transition risk before and after 2016Q4 using several data sources that allow tracking the evolution of transition risk over time.

First, we obtain data on firms' environmental incidents from Reprisk. This database screens daily more than 100,000 media, stakeholders, and third-party sources, including print and online media, NGOs, government bodies, regulators, think tanks, newsletters, social media, and blogs, for news related to firms' ESG practices. Reprisk identifies and rates public attention to firms' environmental scandals and bad pollution events. These events can be used as a measure of firms' transition risk as firms with bad environmental news are usually polluting firms and less likely to be ready for the green transition (Duan et al., 2021). We calculate the fraction of negative environmental news that relates to transition risk for firms scaled by firms' total of all news between 2013 and 2019. Panel A of Figure 3 reveals that the attention to carbon transition risk is lower after Trump's election with the fraction of bad environmental news declining by almost 7pp.

Second, we use the climate risk index of Sautner et al. (2022) between 2013 and 2019. This index is constructed based on quarterly earnings conference calls and captures a forward-looking view of call participants, including investors, firms' executives, and financial analysts, on whether firms have negative or positive climate transition risk exposures based on climate regulatory interventions, threats from climate change events, and technological opportunities. We use data on US firms and calculate the percentage of firms with negative exposure to climate change issues comparing values before and after Trump's election. Panel B of Figure 3 corroborates the findings of Faccini et al. (2021) and shows a decrease in the exposure of firms to transition risk after 2016Q4. After the 2016 election, the percentage of firms with negative exposure to climate transition risk dropped significantly.

[Insert Figure 3]

With carbon transition risk being lower after Trump's election, we expect banks to adjust their securitization activities accordingly. Thus, we formulate our second hypothesis as follows.

H2: Loans given to high carbon emitters have a lower likelihood of being securitized after the election of Donald Trump compared to loans given to low carbon emitters.

2.4 Securitization, the price of carbon risk, and the supply of green loans

Do banks price transition risk when they can securitize? In the securitization process, banks typically earn servicing fees for the securitized assets and income from the sales of securities, whereas loan interest rates will be transferred to the loan purchasers. Thus, banks may have a lower incentive to price borrowers' risks adequately into the loan contract. This incentive depends on whether loan purchasers price these risks in the secondary markets correctly, thereby putting pressure on banks to price the risks in the primary market.

Since the key friction underlying the securitization process is asymmetric information about loan quality (Benmelech et al., 2012), loan purchasers in secondary markets typically do not have private information about firms to accurately price their risks, as banks do. Furthermore, the process of bundling multiple loans into securities and the ease of selling these securities in the secondary markets have been widely recognized as influential factors leading to the phenomenon of asset mispricing (Shleifer and Vishny, 2010). In the context of credit risk, previous papers show that banks can protect themselves against this risk by charging a risk premium into loan contracts or transferring the risk through securitization (Parlour and Winton, 2013; McGowan and Nguyen, 2023).

H3: Securitized brown loans have lower interest rates compared to non-securitized brown loans.

An argument would be that banks may securitize brown loans and offer lower interest rates to facilitate a green transition of these firms. However, if banks merely use securitization as a way to divest brown assets, the securitization decision may not affect the supply of green loans. To this end, we collect information on loan green purposes following Carrizosa and Ghosh (2022) and formulate our fourth hypothesis as follows.

H4: Banks are more likely to provide green loans if they can securitize brown loans.

3 Data and descriptive statistics

Loan-level information We collect loan-level information from Thomson Reuters LPC's DealScan (Dealscan), which covers transactions in syndicated lending markets. Dealscan provides detailed information, such as lender and borrower identities, date of origination, maturity, spread, and loan volume. Data are aggregated at the ultimate parent level for both lenders and borrowers. We retrieve all facilities between 2013 and 2019 issued to publicly traded US firms and exclude firms in the financial sector (SIC codes between 6000 and 6999) from the sample.

Facility volumes are converted to millions of US dollars if applicable utilizing the spot exchange rate that DealScan provides at loan origination. Following De Haas and Van Horen (2013), we allocate loan shares according to the breakdown provided by DealScan, or, if this information is missing, we distribute the loan amount equally among all syndicate members.

As syndicated loans are predominantly granted by a syndicate of lenders, we follow Ivashina (2009) to identify the lead arranger(s) and proceed to exclude participants from the sample.[4] Unlike other participants in the syndicate, lead arrangers play an active role in establishing and negotiating loans, and thus are more informed about firms' environmental performance.

Securitization classification In the spirit of Benmelech et al. (2012) and Bozanic et al. (2018), we identify loans as being securitized by merging securitization information from Creditflux CLO-i with the loan-level information from Dealscan. As the two data sets do not entail a common identifier, we hand-match information using borrowers' names, loan types (for instance, term A or term B loans), and loan maturities. Previous literature shows that relying only on information at loan origination could under-report the presence of CLOs and might lead to a misclassification of loans (Blickle et al., 2020; Lee et al., 2019). Our approach overcomes this concern as we can track when a loan gets securitized, even after its origination date.

Although we cannot observe how much of its share the lead bank sells, contrary to the belief that the lead arranger retains a significant stake in the loan, Bord and Santos (2015) illustrate that in nearly 50% of the loans in which a CLO manager is present among the syndicate participants, the lead bank sells its share completely. Furthermore, Blickle et al. (2020) show that lead arrangers sell their entire share in at least 12% of all loans.

Firms' exposure to carbon transition risk We retrieve information on US firms' carbon emissions between 2013 and 2019 from Refinitiv and consider both carbon emission intensity and the level of carbon emissions as these two measurements reflect different aspects of carbon transition risk.[5] Carbon emission intensity is calculated as the number of tons of carbon dioxide that exceeds thousands of dollars in revenue. An advantage of this measure is that it does

[4]Ivashina (2009) defines the administrative agent as the lead bank if available. If not, lenders that act as agent, arranger, book runner, lead arranger, lead bank, or lead manager are defined to be lead arranger(s).

[5]Berg et al. (2020) shows that Refinitiv rewrites ESG scores leading to different conclusions about their correlation with firms' stock returns. However, this is not of concern for our analysis, since we use carbon emissions reported by the firms themselves.

not correlate with firm size (Aswani et al., 2023). However, the impact of carbon emissions on climate change is based on the absolute emissions that the economy produces. Thus, larger firms with a higher level of carbon emissions are more exposed to carbon risk (Bolton and Kacperczyk, 2022, 2023). In robustness checks, we also use the continuous measures of borrowers' carbon emission intensity and carbon emission level, the continuous measures of Scope 1 carbon emission intensity and Scope 1 carbon emission level, the climate regulatory risk index by Sautner et al. (2022), and firms' ESG scores from Refinitiv as alternative measures of firms' exposure to transition risk.

Figure 4 shows average emission intensities across the 7 industries in our sample. Transportation has the highest emission intensity (3.33 tCO_2/K$) as well as the highest level of emissions (24.71 million tons of carbon dioxide per firm). On the contrary, firms in services, construction, and agriculture have, on average, the lowest emissions intensities and the lowest level of emissions in our sample.

[Insert Figure 4]

Other firm and bank characteristics We retrieve quarterly data on firm characteristics from Worldscope. We require firms to have non-negative, non-zero total assets. All variables are winsorized at the 1st and 99th percentiles. As Dealscan and Worldscope encompass firms' ISINs, we can combine information by merging via ISIN and date.

To zoom into heterogeneous effects across bank characteristics at a later stage of the analysis, we further collect quarterly bank-level information between 2013 and 2019 from Compustat. As there is no common identifier between DealScan and Compustat, we first obtain GVKEYs from Schwert (2018). We then check the names of the unmatched banks and manually identify ISINs.

Summary statistics Table 1 shows summary statistics of our main variables. Our final sample contains information on 3,462 loans granted by 105 banks to 260 borrowers between 2013 and 2019. Based on carbon emission intensity, 40% of loans are given to high carbon emitters. Based on the level of carbon emissions, 35% of loans are granted to high carbon emitters. Between 2013 and 2019, 14% of loans get securitized. A securitized loan can be managed by between 1 and 15 CLO managers. On average, our loans have spreads of 156 bsp and maturity of 4 years. 36% of our loans are secured by collateral.

4 Empirical strategy

To test our first hypothesis, we start with a simple regression model that focuses on the relationship between banks' securitization activities and borrowers' exposure to carbon transition risk. We estimate the following linear probability model (LPM)[6]

$$\begin{aligned}\text{Securitization}_{l,b,f,t} = {} & \beta \text{Carbon Emissions}_{f,t-1} \\ & + \gamma_1 \text{L}_{l,b,f,t} + \gamma_2 \text{F}_{f,t-1} + \gamma_3 \text{C}_{l,b,f,t} \\ & + \delta_f + \delta_{b,t} + \delta_{l,t} + \delta_{l,t} + \varepsilon_{l,b,f,t},\end{aligned} \tag{1}$$

where $\textit{Securitization}_{l,b,f,t}$ takes on a value of 1 if loan l to borrower f in quarter t is securitized by bank b, and 0 otherwise. $\textit{Carbon Emissions}_{f,t-1}$ can be either $\textit{Emission Intensity}_{f,t-1}$ or $\textit{Emissions}_{f,t-1}$ in levels lagged by 1 quarter. *Emission Intensity* is constructed as total emissions of firm f at time $t-1$ measured in tons divided by its total revenue at time $t-1$ measured in thousand dollars. *Emissions* is the total carbon dioxide that borrower f at time $t-1$ emits, measured in the natural logarithm of tons of carbon dioxide.

$L_{l,b,f,t}$ is a vector of loan controls that includes the log of the loan volume, maturity, spread, and whether the loan is secured by collateral. $F_{f,t-1}$ is a vector of firm controls that encompass size, return on assets, equity ratio, and capital expenditures to total assets. These variables are included as their first lags.

[6]We use a LPM estimated via OLS rather than a probit model due to its simplicity in interpretation and model specification given the various multi-way fixed effects. We make sure to address two potential shortcomings of LPM by using standard errors robust to heteroskedasticity and verifying that the predicted values are within the unit interval (Wooldridge, 2010). Of the 3,462 fitted probabilities, 99.9% are within the unit interval.

As securitization can be the result of demand from CLO managers, we include the number of CLO managers $C_{l,b,f,t}$, who buy loan l at any point in time of the life of loan l in all specifications.

We include borrower fixed effects (δ_f) to absorb time-invariant borrower characteristics. Later on, we also include bank-borrower fixed effects to control for the fact that healthy banks may provide credit for healthy borrowers and weak banks may grant loans to weak borrowers. Bank-time fixed effects ($\delta_{b,t}$) are introduced to control for shocks at the bank level that could lead to general changes in banks' securitization activities. Last, we also integrate loan type-time ($\delta_{l,t}$) as well as loan purpose-time fixed effects ($\delta_{l,t}$) to ensure that our results do not reflect differences in loan contracts or are contaminated by loan demand of different types of loans. These fixed effects also control for borrowers' demand for certain types of loans (such as for investment purposes or for buyouts, etc.) over time.

$\varepsilon_{l,b,f,t}$ is the idiosyncratic error term and is clustered at the bank level in our preferred specifications. We test the sensitivity of our results by clustering error terms at the borrower and at the bank-borrower levels. The main coefficient of interest is β which identifies how securitization relates to firms' carbon risk.

4.1 Difference-in-differences design

In the next step, we turn to a difference-in-differences (DiD) estimation to establish a causal relationship between banks' securitization activities and firms' exposure to carbon transition risk. Using the election of Donald Trump in 2016Q4 as an exogenous shock that reduces carbon transition risk, we estimate

$$\begin{aligned} \text{Securitization}_{l,b,f,t} = {} & \zeta \text{Higher Emitter}_f \times \text{Trump}_t \\ & + \eta_1 \mathrm{L}_{l,b,f,t} + \eta_2 \mathrm{F}_{f,t-1} + \eta_3 \mathrm{C}_{l,b,f,t} \\ & + \theta_f + \theta_{b,t} + \theta_{l,t} + \theta_{l,t} + \epsilon_{l,b,f,t}, \end{aligned} \tag{2}$$

where all variables are defined as in Equation (1), except for $\textit{Higher Emitter}_f$, which is a dummy that indicates if firm f emits more or less compared to the average firm before the Trump election. Loans given to these higher emitters are referred to as brown loans. The use of pre-shock emission information makes sure that firms do not change treatment status throughout the sample. This approach also reduces endogeneity concerns because we only capture how banks change securitization activities due to changes in carbon risk because of Trump's election rather than due to changes in firms' behaviors.

We construct the variable $\textit{Higher Emitter}_f$ in two ways. First, based on carbon emission intensity, $\textit{Higher Emitter}_f$ equals 1 if a firm's emission intensity is above the average carbon emission intensity of all firms in our sample between 2013 and 2015, 0 otherwise. Second, based on the level of carbon emissions, $\textit{Higher Emitter}_f$ equals 1 if the total carbon emissions of firm f are above the average of all firms in our sample between 2013 and 2015, 0 otherwise.

$\textit{Trump}_t$ takes on a value of 1 from 2016Q4 onward, which corresponds to the quarter Trump was elected, and 0 otherwise. $\epsilon_{l,b,f,t}$ is the idiosyncratic error term. We cluster standard errors at the bank level.

The main coefficient of interest is ζ which identifies whether loans given to high-carbon emitters are more or less likely to be securitized compared to loans given to low-carbon emitters after Trump's election. We also use continuous treatment variables based on carbon emission intensity and carbon emission level in robustness checks.

4.2 Parallel trends

Critical to our identification strategy is the exogeneity of changes in carbon transition risk with respect to banks' securitization. Previous papers that rely on the election of Trump as an exogenous shock include Ilhan et al. (2021) and Ramelli et al. (2021). We complement these studies by presenting parallel trend tests using the normalized difference approach by Imbens and Wooldridge (2009) to examine anticipatory trends in firms' and banks' characteristics.

Specifically, for loans to low-carbon emitters to serve as a valid counterfactual in our setup, there must be no divergence in the development of treatment and control firms in the absence of treatment. To this end, we aggregate all variables to the borrower level and test if loans issued to the Higher Emitters and to the Lower Emitters were comparable prior to Trump's election.

Table 2 shows normalized differences between the treated and control groups (High vs Low Emitters). Normalized differences are calculated as averages by treatment status scaled by the square root of the sum of the variances. This approach has an advantage over the t-test as it is a scale-free measure of differences in distributions and is not dependent on the sample size (Imbens and Wooldridge, 2009). An absolute normalized difference smaller than 0.25 indicates that there is no significant difference in the evolution of characteristics between treated and control groups.

Panel A of Table 2 reports normalized differences between Higher Emitters and Lower Emitters with the treatment status of borrowers determined on the basis of their emission intensities. It is evident that securitization rates are comparable between treated and control borrowers before Trump's election as the normalized difference is 0.075, much smaller than the 0.25 rule of thumb. Furthermore, interest rates, as well as maturities, are sufficiently similar between the treatment and control groups prior to Trump's election. The only difference that we observe is that treated loans are slightly larger than control loans. However, this difference does not invalidate our empirical strategy as loan amount is more reflective of borrowers' demand and is not our main dependent variable. Additionally, we control for loan amount in all estimations.

[Insert Table 2]

Similarly, we cannot find evidence for a significant difference in the development of firms in the treatment and control groups when considering their annual percentage changes in their return on assets, equity ratio, and ratio of capital expenditures to total assets. Considering bank characteristics, we do not find any statistically significant difference in how banks connected to the treatment and control firms develop in terms of their size, capital ratio, return on assets, and the share of deposits over total assets.

Panel B of Table 2 reports normalized differences between Higher Emitters and Lower Emitters where borrowers' treatment status is based on the level of emissions. We find that all loan, borrower, and bank characteristics meet the assumption of parallel trends. All normalized differences being smaller than the 0.25 rule of thumb.

Figure 5 displays treatment coefficients and confirms the picture that emerged from considering normalized differences. We interact $Higher\ Emitter_f$ with a set of quarter semi-annual dummies using 2016Q4 as the reference point. We find that all coefficients are not significant before Trump's election irrespective of whether we use emission intensity or the level of emissions to determine firms' treatment status. This exercise does not present evidence that parallel trends are absent.

[Insert Figure 5]

5 Results

5.1 Banks' securitization activities and borrowers' exposure to carbon transition risk

Panel A of Table 3 reports the results of estimating Equation (1) that regresses the indicator variable *Securitization* on firms' carbon emissions. In all columns, we include loan characteristics (spread, maturity, loan amount, and whether the loan is secured by collateral), time-varying borrower characteristics (size, profitability, equity ratio, and capital expenditure ratio), and the number of CLO managers that buy loans in secondary markets. We also use borrower, bank-time, loan type-time, and loan purpose-time fixed effects throughout all columns to control for a specific loan, time-invariant borrower, and bank characteristics.

As the decision to securitize is made at the bank level, we cluster error terms at the bank level in Columns (1) and (4). However, as a borrower's treatment status depends on the level of carbon emissions, we also cluster standard errors at the borrower level and report our findings in Columns (2) and (5). In Columns (3) and (6), we double cluster standard errors at the bank and the firm level and include bank-firm fixed effects to control for selection bias that arises from certain banks being more likely to match with certain borrowers.

We use emission intensity in Columns (1), (2), and (3) as the main explanatory variable for changes in banks' decision to securitize. The results show that loans are around 4 pp more likely to be securitized when the respective borrowers increase their emission intensities by 1 tCO_2/K\$. Our findings do not change much across the 3 columns when we change clustering levels and the use of fixed effects. This suggests that the results are unlikely to be driven by omitted variables or the choice of methodologies. The magnitude of this effect is equivalent to an increase of 28%, considering that, on average, the securitization rate in our sample is 14%.

In Columns (4), (5), and (6), we examine the relationship between borrowers' carbon footprints and loan securitization using the level of emissions as our main explanatory variable. We find that when borrowers emit an additional 1 ton CO_2, their loans' securitization probabilities increase by around 3 pp. This supports our first hypothesis.

[Insert Table 3]

Next, we employ a DiD design to estimate the causal effect of borrowers' emissions on loan securitization using Trump's election as an exogenous shock to carbon transition risk. Panel B in Table 3 reports the results. Specifically, we regress the indicator variable *Securitization* on the interaction between *High Emitter* and *Trump*. In Columns (1), (2), and (3), the treatment status, *Higher Emitter*, is a dummy variable that equals 1 if a borrower's carbon emission intensity is above that of an average borrower before the Trump's election, and 0 otherwise. In Columns (4), (5), and (6), we use the level of carbon emissions to determine a borrower's treatment status.

Across all specifications of Panel B in Table 3, the coefficient estimates on *Higher Emitter* × *Trump* are negative and statistically significant. This suggests that the probability of banks securitizing brown loans decreases when carbon risk is lower after Trump's election. The economic magnitude of this effect is nontrivial. For illustration, banks are 4.3 to 4.5 pp less likely to sell loans granted to higher emitters to CLO managers when we use emission intensity to determine borrowers' treatment status. As the mean of our dependent variable *Securitization* is 14%, the coefficient estimates imply a decrease of 30% to 32% relative to the average likelihood of securitization. Using the level of carbon emission to determine whether a borrower is a Higher Emitter yields similar results, banks are 3.4 to 3.7 pp less likely to securitize brown loans after Trump's election. The magnitude of this effect is equivalent to a decrease of between 24% and 26% relative to the mean probability of securitization.

5.2 Securitization, carbon pricing, and the supply of green loans

As banks can also price exposure to carbon transition risk through rising interest rates (Ivanov et al., 2021; Kacperczyk and Peydró, 2021; Fuchs et al., 2023), an important question that arises is how do banks choose between carbon risk pricing and carbon risk shifting? To understand this trade-off, we explore whether banks adjust loan spreads differently when securitizing carbon-intensive loans. We estimate the following equation

$$\begin{aligned} \text{Spread}_{l,b,f,t} =& \beta_1 \text{Higher Emitter}_f \times \text{Securitization}_{l,b,f,t} \\ &+ \beta_2 \text{Securitization}_{l,b,f,t} \\ &+ \gamma_1 \text{L}_{l,b,f,t} + \gamma_2 \text{F}_{f,t-1} + \gamma_3 \text{C}_{l,b,f,j,t} \\ &+ \zeta_f + \zeta_{b,t} + \zeta_{l,t} + \eta_{l,t} + \varepsilon_{l,b,f,j,t}, \end{aligned} \tag{3}$$

where all variables are the same as in Equation (1) except that we use $\text{Spread}_{l,b,f,j,t}$ as our dependent variable. We cluster our error terms at the bank level. As before, Higher Emitter_f is a dummy that takes on a value of 1 if a borrower's emission intensity or emission level exceeds the average, and 0 otherwise.

Column (1) of Table 4 shows that, all else equal, for loans given to high carbon-intensive borrowers, banks offer a 65 bsp discount if they can securitize these loans. Column (2) reports that loans given to borrowers with high levels of carbon emissions get a 39 bsp discount if banks can sell these brown loans to CLO managers. Both results are consistent with our third hypothesis, which suggests that banks may not have as much incentive to price carbon transition risk when they are able to securitize these assets. This is because banks do not earn interest income on these securities, but rather generate revenue through securitization fees and profits from the sale of the securities.

Banks offering a carbon discount for securitized loans may not be an issue if these banks use securitization as a way to raise additional funding to finance a green transition. To test whether this is the case, we follow Carrizosa and Ghosh (2022) and hand-collect information on the supply of green loans based on whether banks include sustainably linked pricing provisions in loan contracts or if these loans are for funding green projects related to producing renewable energy, wind farms, and energy efficiency projects. Examples of sustainability-linked loans are loans with pricing terms relying on whether borrowers meet certain targets for improvements in ESG performance, such as reduction in carbon emissions.

We regress the indicator variable *Green Loan* on the interaction between *Securitization* and *Higher Emitter*. All control variables and fixed effects are the same as in Equation (3). Columns (3) and (4) of Table 4 show that the odds of supplying green loans do not increase when banks can securitize brown loans to CLO managers. Taken together with the previous results, we find that banks offer carbon discounts for polluting borrowers when they can shift transition risk away but the additional funding from securitization markets is not aiding the green transition of the borrowers.

5.3 Heterogeneous effects across banks' characteristics

In this section, we dive into the heterogeneity in our findings across banks' characteristics. This allows us to shed light on who are the banks that display the observed securitization behavior. One question that arises naturally in this context is whether green banks' securitization activities change after Trump's election compared to non-green banks. Previous literature highlights green preferences of banks may play a role in their decision-making (Degryse et al., 2021; Kacperczyk and Peydró, 2021). Understanding whether green banks respond differently to a shock to climate transition risk can shed light on whether they genuinely care about the transition to a greener economy or use climate awareness simply to create a perception that they are act socially responsible. Furthermore, we explore how several other bank characteristics interact with banks' management of carbon transition risk, including their location, capitalization, and size.

Do green banks behave differently? Following Gantchev et al. (2022), we first collect information on banks' ESG scores before Trump's election and define banks that have ESG scores as green banks. The reason for this definition is that when a bank does not have an ESG score, it is an indication that they are not concerned about ESG issues as much as other banks. We report estimation results for the sub-sample of banks with ESG scores in Column (1) of Table 5, and for banks with no ESG score in Column (2). As before, in Panel A, we use carbon emission intensity, and in Panel B, we use the carbon emission level of borrowers to determine their treatment status. The results suggest that the securitization decisions of banks without an ESG score are more sensitive to the level of carbon transition risk compared to banks with an ESG score.

Next, we employ an alternative approach to identify green banks by following Degryse et al. (2021). Banks are considered to have green preferences if they joined the United Nations Environmental Programme (UNEP) Finance Initiative before Trump's election. Column (3) shows the results for the sub-sample of banks that joined before while Column (4) illustrates the findings for the sub-sample of banks that did not join or only joined after the election. This exercise highlights that only banks that did not join the UNEP react to the lower risk of a carbon transition by being less likely to securitize brown loans.[7]

[Insert Table 5]

[7] In unreported results, we repeat this exercise while disregarding the time when banks joined the initiative to capture the fact that some banks may have green preferences before they officially decide to join. The results are unchanged.

Our results suggest that green banks did not use securitization as a risk-shifting tool as much as other banks. In this sense, our findings complement the previous findings of Degryse et al. (2021) and Bolton and Kacperczyk (2023) who document the real effects of green preferences of banks.

US vs non-US banks Zooming into the importance of other bank characteristics, we first investigate the role of banks' locations. The idea is that non-US banks may not respond to the US election outcome as much as US banks. In particular, EU banks may have different perspectives, given that the European Union quickly ratified the 2015 Paris Agreement and continued to focus on environmental policies between 2016 and 2019 to decarbonize the economy (in contrast to US policies). Furthermore, other non-EU and non-US banks may have less motivation to manage climate transition risk if there are not many prominent environmental policies implemented in their countries.

In Columns (5) and (6) of Table 5, we estimate Equation (2) for US, and non-US banks separately. The results confirm our expectations. Only US banks are less likely to securitize loans granted to firms with increasing emission intensities after the election. In contrast, the decisions of non-US banks to securitize brown loans do not change after Trump's election.

Other bank characteristics Next, we consider how banks' capitalization interacts with the link between the propensity to securitize and firms' environmental performance. Banks with less capital may be more responsive in their securitization decisions, as they have lower capital buffers to take climate risk considerations into account. Moreover, loan sales theories focus on the role of bank capital (Gorton and Pennacchi, 1995; Pennacchi, 1988) as banks with lower levels of capital tend to securitize loans more to reduce risk-weighted assets and capital requirements. Therefore, we include the triple interaction terms *Higher Capital* $\times$ *Higher Emitter* $\times$ *Trump* and report the result in Columns (1) and (3) of Table 6. The results suggest that our results are stronger for low-capital banks, consistent with the view that less capitalized banks are more likely to use securitization to shift risk.

[Insert Table 6]

Next, we look into the role of banks' deposits and their size. First, banks with more deposits may not need to securitize that many assets as they are less likely to be concerned about funding sources. We introduce the triple interaction term *High Deposit* × *Higher Emitter* × *Trump* in Columns (2) and (5). The variable enters our regression with positive and significant effects, illustrating that our results banks with lower levels of deposits are more likely to adjust their securitization of brown loans based on the level of carbon risk.

Second, large banks are often subject to higher capital requirements, resulting in better protection from losses related to transition risk. Hence, these banks may be less concerned than other banks about transition risk (Beyene et al., 2021). However, larger banks could also have better access to secondary markets, are better informed, and therefore may be more responsive in their securitization decisions, consistent with the view that bank size is a proxy for diversification and efficiency (Demsetz and Strahan, 1997). To this end, we include the variable *Large Bank* × *Higher Emitter* × *Trump* and report the result in Columns (3) and (6). We find that larger banks are more reactive to changes in carbon transition risk, and our results are more prominent for these banks.

6 Robustness checks

6.1 Placebo exercises

First, we utilize placebo tests to establish that the treatment effects are not observable in the absence of our shock. Figure 6 plots estimates for *Higher Emitter* × *Trump* and 95% confidence intervals for regressions in which we define eight placebo events between 2014Q1 and 2015Q4. We find insignificant effects in each placebo regression, regardless of whether we define the treatment status *Higher Emitter* using carbon emission intensity or carbon emission level.

[Insert Figure 6]

6.2 External validity

We conduct two external validity tests to verify that our findings are not driven by specific choices of the event (the election of 2016), or that our results are only applicable to US markets.

First, one may argue that another turning point for carbon transition risk to be lower in the United States is the withdrawal from the Paris Agreement in 2017Q2. Therefore, we use the date on which the United States officially withdrew from the Paris Agreement and re-estimate our Equation (2). Columns (1) and (2) of Table 7 confirm that banks are less likely to securitize brown loans when the transition risk is lower.

Second, to rule out that our results are only applicable to US banks given that the US has the largest securitization market worldwide, we replicate our tests using the sample of syndicated loans given to EU firms between 2013 and 2019. We again collect carbon emission intensity from Refinitiv and firm-level characteristics from Worldscope for these firms. We exploit the biggest regulatory change in the EU related to climate change, the adoption of the Paris Agreement in 2015Q4 and estimate the following equation

$$\begin{aligned}\text{Securitization}_{l,b,f,t} = {} & \beta_1 \text{Higher Emitter}_f \times \text{Paris Agreement}_t + \theta_1 \text{Paris Agreement}_t \\ & + \gamma_1 \text{L}_{l,b,f,t} + \gamma_2 \text{F}_{f,t-1} + \gamma_1 \text{C}_{l,b,f,t} \\ & + \zeta_f + \zeta_{b,t} + \zeta_{l,t} + \eta_{l,t} + \varepsilon_{l,b,f,t},\end{aligned} \tag{4}$$

where all variables are the same as in Equation (3) except Paris Agreement$_t$ which takes value of 1 before 2015Q4, and 0 otherwise.

Columns (3) and (4) of Table 7 show that banks are more likely to securitize brown loans in the EU after the Paris Agreement. Column (1) reports that after the Paris Agreement, banks are 15 to 19 pp more likely to sell brown loans. This additional information confirms that our findings are applicable beyond the US context and that banks actively use securitization to manage their exposure to carbon transition risk.

6.3 Pricing of carbon transition risk in CLO markets

A danger to our findings is that banks may simply react to pricing policies of loan purchasers and investors in the secondary markets. First, it could be that banks did not sell brown loans more often in secondary markets when the transition risk is low because CLO managers prefer not to buy these loans. To alleviate this concern, we collect transactional data from Crediflux CLO-i for all purchases of term loans that US CLO managers made between 2013 and 2019 and test if CLO managers change their pricing of brown loans after Trump's election. If CLO managers adapt their pricing strategies in response to Trump's election, one may argue that banks change their securitization activities due to changes in demand in CLO markets.

Columns (1) and (2) of Table 8 illustrate that CLO managers do not change their pricing strategies for brown loans when carbon transition risk is lower. In all regressions, we include credit ratings of firms that have term loans bought by CLO managers. We also include CLO-year, firm, and industry-year fixed effects across all tests. Error terms are clustered at the CLO manager level. The coefficient estimates for *Higher Emitter* × *Trump* are virtually not different from 0. This finding is also consistent with previous literature showing that loan purchasers in secondary markets have less incentive to price the risk correctly because they do not hold these loans until maturity (McGowan and Nguyen, 2023). Thus, our findings are unlikely to be driven by the demand of CLO managers but rather by banks' incentives that result from managing climate.

[Insert Table 8]

Second, investors who buy securities from CLO managers could also charge carbon premia depending on how they expect the level of carbon transition risk to develop. While we do not observe who these investors are, we utilize information at the transactional level on the prices of these securities from Creditflux CLO-i when CLO managers sell them for the first time to investors. We regress sale prices of these securities on the interaction between *Higher Emitter* and *Trump* and report the results in Columns (3) and (4) of Table 8. We find no evidence that investors change carbon premia after Trump's election. This is consistent with anecdotal evidence from recent news coverage highlighting that investors in leveraged loan markets find it difficult to price ESG practices and green transition efforts of firms given the limited information available.[8] Furthermore, given the complex structure of securities in securitization markets, it is harder for investors to track how carbon-intensive some securities are after several loans issued by different firms are packaged together.

Taken together, these tests on the pricing of carbon transition risk in secondary markets reinforce that our results are not confounded by demand from CLO managers or the pricing strategies of investors.

6.4 Banking deregulation during Trump's administration

One concern is that we capture changes in securitization decisions due to a series of banking deregulation that took place during Trump's administration. As we use bank-time fixed effects, banking deregulation under the Trump administration unlikely affects our results. Nevertheless, we formally test this concern and report the results in Table 9. In order to observe the effect of Trump's banking deregulation, we only use bank fixed effects instead of bank-time fixed effects.

First, during 2018 and 2020, a majority of US banks did not have to raise capital to comply with the Basel III requirements. When banks do not have to raise additional capital, they may not need to securitiz. We address this concern by including the interaction *Trump* $\times$ *More Capital* in our regressions and re-estimate Equation (2). Column (1) of Table 9 shows that banks with higher capital ratios indeed reduce securitization after the election but our main findings remain unchanged.

Second, the 2018 rollback of banking regulations allows the majority of medium and large banks to not comply with the liquidity requirements suggested by Basel III. As a result, these banks do not have to maintain a net stable funding ratio of 30% or a liquidity coverage ratios of 100%. We examine whether lower liquidity requirements after 2018 would contaminate our results by including the interaction *Trump* $\times$ *More Liquid Assets* in our model and report the

[8] "CLO managers under pressure to ramp up efforts on ESG investing", Reuters, Nov. 2019.

result in Column (2). This additional interaction term does not show a significant effect on the probability of securitization and does not alter our results.

[Insert Table 9]

Third, banking deregulation may motivate banks to rely on wholesale funding rather than sticky deposits. We address this concern in Column (3). Not only is the coefficient estimate on *Trump* × *More Deposits* statistically insignificant but also the magnitude of *Trump* × *Higher Emitter* remains similar to what we find in Table 3.

Next, banking deregulation in 2018 focuses on larger banks. For example, the Trump Administration removed the requirement to have resolution plans for bank holding companies in the \$100 to \$250 billion size range. These banks also did not have to conduct capital stress tests like other banks with total assets of above \$250 billion. For example, Silicon Valley Bank's parent company was one of the banks in this size bucket. We examine how these factors affect our findings in Columns (4), and (5). In Column (4), we interact *Trump* with an indicator *Above \$250 Bil.* which equals 1 if banks' total assets are above \$250 billion, and 0 otherwise. In Column (5), we interact *Trump* with a dummy variable *\$ 100-250 Bil.* which equals 1 if banks' total assets are above \$100 billion and below \$250 billion, and 0 otherwise. All these exercises confirm that our main findings are not sensitive to banking deregulation that targets these groups of banks.

Finally, one may argue that globally systemically important banks may not care about carbon transition risk as much as other banks given that they are considered to be too big to worry about standed assets (Beyene et al., 2021). We address this concern by including an interaction term between *Trump* and *G-SIB* in Column (6) of Table 9. This interaction term appears to remain statistically insignificant and fails to moderate the relationship between banks' securitization activities and borrowers' exposure to carbon risk.

6.5 Borrowers' credit risk

Several papers suggest that borrowers' credit risk could correlate with their carbon transition risk (Carbone et al., 2021). For example, it could be that credit-restricted borrowers cannot invest in green technologies to reduce carbon emissions. Thus, a caveat would be that our results may simply capture changes in banks' securitization decisions due to borrowers' credit risk.

We show that this does not hold true in Table 10. In Columns (1) and (4), we proxy firms' credit risk by controlling for whether a borrower has a credit rating and its interaction with *Trump*. In Columns (2) and (5), we consider that the credit risk of a loan is higher when the loan has no collateral and control for the interaction between whether a loan is secured by collateral and *Trump*. Next, we control for firms' credit risk by credit constraint indexes as proxies. We use the size-age index by Hadlock and Pierce (2010) in Columns (3) and (6) and the Z-score by Altman (1968) in Columns (4) and (7). If our results are driven by credit risk rather than carbon risk, we would not be able to observe significant effects of *Trump* $\times$ *Higher Emitter* on banks' securitization activities anymore. However, we find that all proxies for borrowers' credit risk interacted with $Trump$ enter our specifications insignificantly and do not invalidate our main results.

[Insert Table 10]

6.6 Alternative measures of climate transition risk

Table 11 demonstrates that our results are robust to alternative ways in which firms' exposure to transition risk is defined or measured. In Columns (1) and (2), we replace the indicator *Higher Emitter* by continuous measures of borrowers' carbon emission intensity and carbon emission level. In Columns (3) and (4), we use the continuous measures of Scope 1 carbon emission intensity and Scope 1 carbon emission level instead of total emissions as in our main tests. All results reinforce that our main findings are not driven by specific choices of how we measure borrowers' carbon footprints.

Next, one may argue that carbon emissions may not reflect all aspects of borrowers' exposures to carbon transition risk as carbon-intensive firms can invest to transform their production chains and benefit from the green transition. Therefore, we employ two other measurements to capture firms' transition risk: ESG scores collected from Refinitiv (Column (4)) and a proxy for firms' regulatory risk related to climate change from Sautner et al. (2022) (Column (5)). ESG scores incorporate a more forward-looking view on firms' environmental performance as they rest on e.g., investments or investment plans as well as on the adaption of emission targets or climate change frameworks. However, Berg et al. (2020) documents widespread changes to the historical ratings of Refinitiv's ESG scores. To this end, we complement our analysis using a measure of climate regulatory risk developed by Sautner et al. (2022). This proxy has the advantage of capturing a view from within firms as it is based on the conversation around regulatory topics related to climate change in quarterly earnings conference calls between board members of firms, financial analysts, and other stakeholders. For both alternative measures, we create binary indicators that take on a value of 1 when a firm has a higher ESG score or a higher regulatory risk index compared to the average. Our findings remain unaffected.

6.7 Further robustness checks

Loan Demand: One potential concern about our findings is the possibility that, compared to low carbon emitters, high carbon emitters might have exhibited different patterns of loan demand before and after the Trump election. It's plausible that high carbon emitters had a higher demand for loans prior to the election and a lower demand afterward. Consequently, banks might have needed to securitize more brown loans before the 2016 election to cater to this heightened demand, but subsequently securitized fewer after the election due to decreased demand.

However, in our baseline analysis, which incorporates firm fixed effects, loan type-time, and loan purpose-time fixed effects, and controls for firm characteristics, we have taken measures to mitigate the influence of loan demand on our results. Nevertheless, to delve deeper into this issue, we conducted additional tests to explore whether the likelihood of borrowers obtaining new loans changed after the Trump election depending on their carbon emission status.

Our findings in Appendix Table A2 show that following the Trump election, there was no statistically significant difference in loan demand between high carbon emitters and low carbon emitters. This suggests that any potential variations in loan demand between these two categories of borrowers did not significantly affect our results.

Other non-banks: As one may argue that banks may shift risk by involving other non-banks in the syndication as participants, not just CLO managers, we alleviate this concern by testing if the probability of having a non-bank in a syndicated loan depends on the level of carbon transition risk. In Columns (1) and (2) of Appendix Table A3, we regress the probability of having a non-bank that is not a CLO manager in the loan contract on borrowers' carbon emission intensity and the level of carbon emissions. In contrast to what we find for the securitization behavior of banks, we do not see any clear evidence that banks are able to shift carbon transition risk by having non-banks who are not CLO managers in the loan contract. If anything, we find weak evidence that non-bank non-CLO institutions (mostly mutual funds) are less likely to be participants if the carbon emission intensity of borrowers is higher. This finding is in line with Ceccarelli et al. (2023) who find that many mutual funds care about green assets and reduce their exposure to high carbon risk firms.

In Columns (3) and (4) of Appendix Table A3, we test the causal effect of carbon transition risk on the involvement of non-bank non-CLO participants in syndicated loans. We again find that, after Trump's election of 2016, when carbon transition risk is lower, there is no evidence that banks are less likely to shift this risk to non-bank non-CLO participants.

Our findings confirm that carbon transition risk shifting is a unique phenomenon that banks make use of in corporate loan securitization markets. To this extent, our findings support what Emin et al. (2023) document that CLOs can provide arbitrage capital and act as shock absorbers to buy loans that are less in demand in institutional loan markets whereas mutual funds cannot. However, this fact also highlights that when carbon transition risk is higher, the risk can be concentrated in the shadow markets that are outside the regulatory perimeter, as CLO markets are far less regulated and less transparent compared to other markets (Emin et al., 2023).

Other policy changes under the Trump administration: Trump's election did not only shift expectations of future environmental policies or banking deregulation but also of other policy fields. Prospective changes in these other fields are shown to affect firms differently depending on their characteristics (Wagner et al., 2018). To ensure that our effects indeed capture the relative impact of firms' carbon footprint on banks' securitization decisions and are not driven by other changes correlated with the election of Trump, we introduce additional interaction terms with relevant firm and regulatory characteristics and *Trump* in Appendix Table A4.

In Column (1), we include an interaction term with firms' income tax rates as Trump's election implied lower corporate taxes. In Column (2), we employ an indicator for whether a firm is part of the tradeable sector as Trump announced stricter trade policies (Wagner et al., 2018). In Column (3), an interaction with firms' governance scores is introduced to capture that Trump implied financial deregulation generally would impact firms to different degrees depending on their corporate governance (Ramelli et al., 2021). Our results are qualitatively unaffected by these tests.

Other methodological choices: Finally, Appendix Table A5 shows that our findings are not driven by anticipation or the clustering schemes selected. For example, in Columns (1) and (5), we drop observations in 2016 from the sample to control for the possibility that markets anticipate the election outcome. In the same vein, we also exclude the year 2019 in Columns (2) and (6). In Columns (3) and (7), we cluster error terms at the bank and time level. In Columns (4) and (8), we cluster error terms at the bank and industry level. We continue to observe the same effect that banks are less likely to securitize brown loans when the carbon transition risk is lower.

7 Conclusion

Using the election of Donald Trump in 2016 as an exogenous shock to carbon transition risk, we present novel evidence that banks use securitization to manage their exposure to firms' transition risk. Our main result illustrates that banks are significantly more likely to securitize a loan if the borrower is a high-carbon emitter. In contrast, when transition risk is lower, banks adapt quickly and cut back on the securitization of brown loans.

We also show that securitization allows banks to offer lower interest rates for loans given to high carbon emitters but there is no evidence that securitization enables banks to fund more green loans. This finding implies that risk-shifting through loan securitization undermines the green transition as it diminishes the incentive of banks to price carbon risk and does not lead to an increase in the supply of green loans.

Zooming into which banks are driving these effects, we highlight that banks without preferences for green lending, US banks, large banks, banks with lower level of deposits, and banks with lower capital ratios are more likely to manage carbon transition risk by securitization.

Our findings provide important insights for the design of future environmental policies directed at banks. As banks can manage transition risk using securitization, policymakers should be aware of this fact when designing climate-related capital and liquidity requirements. Policymakers need to understand who is actually carrying the risk and how much skin in the game banks have to make sure to avoid underestimating banks' exposure. Our results provide a first understanding of whether banks intend on shifting transition risk off their balance sheets via securitization as well as why they use this channel rather than pricing carbon risk in loan contracts. A limitation of our approach is that we can only document the findings related to the extensive margin in securitization activities rather than the intensive margin. We can say little about how much skin in the game banks retain, as we do not observe how much of their share banks are willing to sell or how how these shares vary when carbon transition risk changes. We leave this question to future research.

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Tables

Table 1: Summary statistics

	Observations	Mean	Std. dev.	P25	Median	P75
Securitization	3,462	0.14	0.34	0.00	0.00	0.00
Maturity	3,462	4.35	1.82	3.00	5.00	5.00
Loan Spread	3,462	156.46	110.98	100.00	125.00	200.00
Ln(Loan Amount)	3,462	1.66	2.15	0.46	0.98	1.77
No. of CLO Managers	3,462	5.31	15.71	0.00	0.00	0.00
Secured	3,462	0.36	0.48	0.00	0.00	1.00
Trump	3,462	0.44	0.50	0.00	0.00	1.00
Higher Emitter	3,462	0.24	0.43	0.00	0.00	0.00
Higher Emitter (Level)	3,462	0.35	0.48	0.00	0.00	1.00
Emission Intensity (ton)	3,462	1.03	2.53	0.02	0.08	0.48
Total Emissions (Ln)	3,462	10.28	19.41	0.31	1.23	7.68
Lower ESG Score	3,256	0.43	0.50	0.00	0.00	1.00
Higher Rrisk	3,330	0.22	0.42	0.00	0.00	0.00
Pre-shock Emission Intensity	3,462	1.31	3.36	0.03	0.11	0.69
Pre-shock Emission Level	3,462	0.01	0.02	0.00	0.00	0.01
Borrower Size	3,462	23.63	1.13	22.75	23.61	24.43
Borrower ROA	3,462	2.56	28.71	3.39	5.38	9.24
Borrower Equity	3,462	26.19	24.95	18.29	28.09	39.53
Borrower Capex	3,462	1.31	1.18	0.52	1.02	1.77
No Rating	3,462	0.22	0.42	0.00	0.00	0.00
Borrower Tax Rate	2,687	25.50	13.60	17.03	26.29	34.29
Tradable	3,462	0.43	0.50	0.00	0.00	1.00
G-Index	2,251	0.09	0.02	0.08	0.09	0.11
Borrower SA Index	3,462	-0.04	5.26	-1.83	1.69	3.42
Borrower Z-score	3,330	1.47	1.05	0.62	1.40	2.02
Target	3,462	0.23	0.42	0.00	0.00	0.00
Joined UNEP	3,462	0.38	0.49	0.00	0.00	1.00
US Bank	3,462	0.67	0.47	0.00	1.00	1.00
More Capitals	3,097	0.41	0.49	0.00	0.00	1.00
Larger Banks	3,188	0.50	0.50	0.00	0.00	1.00
More Liquid Assets	3,331	0.83	0.38	1.00	1.00	1.00
Total Assets above $250 bil.	3,462	0.09	0.28	0.00	0.00	0.00
Total Assets $100-250 bil.	3,462	0.00	0.00	0.00	0.00	0.00
G-SIB	3,462	0.88	0.33	1.00	1.00	1.00
Bank Equity	3,078	8.48	2.41	7.01	8.93	10.25
Bank ROA	2,380	0.20	0.14	0.11	0.23	0.29
Bank Deposits	2,377	55.33	10.32	52.36	55.78	62.10

This table reports descriptive statistics for the variables used in the main empirical analysis. The baseline sample consists of 3,462 loan observations that are granted to US borrowers between 2013 and 2019. Information is collected from Dealscan and matched with CLO-i Creditflux, Refinitiv, Compustat, S&P Capital IQ and Worldscope. All continuous variables are winsorized at the 1st and 99th percentile. Appendix Table A1 provides detailed variable definitions.

Table 2: Parallel trends

Treatment status based on carbon emission intensity					
	Treated		Control		Norm. diff
Variable	Mean	SD	Mean	SD	
Loan characteristics					
Securitization	0.075	0.189	0.061	0.184	0.05
Loan Amount	1.230	0.790	1.825	1.774	-0.31
Loan Spread	147.532	58.624	137.731	92.547	0.09
Maturity	4.482	0.904	4.429	1.039	0.04
Firm characteristics					
ΔBorrower Size	4.815	6.185	4.595	9.123	0.02
ΔBorrower ROA	-0.083	0.571	-0.174	0.850	0.09
ΔBorrower Equity	-0.030	0.146	-0.004	0.328	-0.07
ΔBorrower Capex	5.332	16.770	5.672	18.822	-0.01
Bank characteristics					
ΔBank Size	0.625	4.569	0.514	3.118	0.02
ΔBank Equity	3.216	2.505	3.529	2.128	-0.10
Δ Bank Debt	-3.802	5.691	-4.777	4.489	0.13
ΔBank Deposits	2.172	1.613	2.568	1.348	-0.19
Treatment status based on carbon emission level					
	Treated		Control		Norm. diff
Variable	Mean	SD	Mean	SD	
Securitization	0.042	0.145	0.071	0.197	-0.12
Loan Amount	1.812	1.535	1.698	1.717	0.05
Loan Spread	124.347	64.719	144.721	94.507	-0.18
Maturity	4.334	1.007	4.475	1.020	-0.10
Firm characteristics					
ΔBorrower Size	4.736	6.542	4.593	9.381	0.01
ΔBorrower ROA	-0.029	0.570	-0.206	0.879	0.17
ΔBorrower Capex	3.411	18.075	6.415	18.601	-0.12
Bank characteristics					
ΔBank Size	0.326	4.249	0.607	3.021	-0.05
ΔBank Equity	3.416	2.196	3.501	2.195	-0.03
Δ Bank Debt	-4.369	5.051	-4.709	4.585	0.05
ΔBank Deposits	2.293	1.433	2.576	1.387	-0.14

This table reports statistics of relevant covariates over the pre-shock period (2013Q1 to 2016Q3), dividing the sample into treated (Higher Emitter) and control (Lower Emitter) firms. The last column reports normalized differences between treatment and control groups, which are differences in averages by treatment status, scaled by the square root of the sum of the variances. This approach has an advantage over the t-test approach as it is a scale-free measure of the difference in distributions and not dependent on the sample size. According to Imbens and Wooldridge (2009), an absolute difference smaller than 0.25 indicates no significant difference between the groups. Firm and bank characteristics are reported as annual percentage changes (in %).

Table 3: Transition risk and loan securitization

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Securitization					
Treatment status based on	*Intensity*			*Level*		
Panel A: Relationship between securitization and borrowers' carbon footprints						
Carbon Emission	0.047***	0.038**	0.038**	0.028***	0.021**	0.021**
	(0.013)	(0.019)	(0.018)	(0.005)	(0.011)	(0.008)
Loan Maturity	0.013***	0.009	0.009	0.013***	0.009	0.009
	(0.004)	(0.007)	(0.007)	(0.005)	(0.007)	(0.007)
Loan Spread	0.000*	0.000	0.000	0.000*	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Loan Amount)	0.003	0.003	0.003	0.003	0.003	0.003
	(0.003)	(0.005)	(0.004)	(0.003)	(0.005)	(0.005)
Number of CLO managers	0.013***	0.013***	0.013***	0.012***	0.012***	0.012***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Secured Loan	0.028	0.054	0.054*	0.034	0.059*	0.059**
	(0.020)	(0.033)	(0.028)	(0.020)	(0.033)	(0.028)
Panel B: Trump's election and the securitization of brown loans						
Higher Emitter × Trump	-0.043***	-0.045*	-0.045**	-0.036***	-0.037**	-0.037**
	(0.012)	(0.024)	(0.023)	(0.010)	(0.018)	(0.017)
Loan Maturity	0.012***	0.008	0.008	0.012***	0.008	0.008
	(0.005)	(0.007)	(0.007)	(0.005)	(0.007)	(0.007)
Loan Spread	0.000*	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Loan Amount)	0.003	0.003	0.003	0.003	0.003	0.003
	(0.003)	(0.005)	(0.005)	(0.003)	(0.005)	(0.005)
No. CLO Managers	0.013***	0.013***	0.013***	0.013***	0.013***	0.013***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Secured Loan	0.030	0.058*	0.058**	0.029	0.056*	0.056**
	(0.020)	(0.033)	(0.028)	(0.020)	(0.033)	(0.028)
Observations	3,462	3,462	3,462	3,462	3,462	3,462
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	No	Yes	Yes	No
Bank - Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank - Firm FE	No	No	Yes	No	No	Yes
Loan Type - Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose - Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.886	0.866	0.863	0.886	0.866	0.863
Clustering	Bank	Firm	Bank, Firm	Bank	Firm	Bank, Firm

This table reports the estimate of Equation (1) in *Panel A* and the estimate of Equation (2) in *Panel B*. *Securitization* takes on a value of one if a loan is securitized by banks, and 0 otherwise. *Trump* indicates the period after Trump's election. *Carbon Emissions* can be either the *Carbon Emission Intensity* or *Carbon Emission Level* of a borrower. *Intensity* is the ratio of a firm's total carbon emissions in tons over its revenue measured in thousand dollars reported in Columns 1 to 3. *Level* is the total carbon emissions that a borrower emits measured in the natural logarithm of tons of carbon dioxide reported in Columns 4 to 6. *Higher Emitter* takes on a value of one if a firm has its emission intensity above the mean before Trump's election (i.e. from 2013 to 2015), and zero otherwise. Firm controls include *Firm Size*, *Firm ROA*, *Firm Equity*, and *Firm Capex*. Other variables are defined in the Appendix. Standard errors are clustered at the bank level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 4: Securitization, carbon risk pricing, and supply of green loans

	(1)	(2)	(3)	(4)
Dependent variable:	Loan Spread		Green Loan	
Treatment status based on	*Intensity*	*Level*	*Intensity*	*Level*
Securitization	27.389***	19.253***	-0.003	-0.002
	(6.121)	(7.265)	(0.002)	(0.002)
Securitization × Higher Emitter	-65.431***	-39.066***	0.002	0.001
	(9.651)	(6.945)	(0.002)	(0.002)
Firm Size	-7.347	-6.960	0.002	0.002
	(8.504)	(8.433)	(0.002)	(0.002)
Firm ROA	-0.054**	-0.061***	0.000	0.000
	(0.022)	(0.022)	(0.000)	(0.000)
Firm Equity	-0.486**	-0.460**	0.000	0.000
	(0.213)	(0.219)	(0.000)	(0.000)
Firm Capex	-4.653*	-4.674*	-0.000	-0.000
	(2.771)	(2.782)	(0.001)	(0.001)
Loan Maturity	3.650**	3.558**	0.000	0.000
	(1.784)	(1.768)	(0.000)	(0.000)
Ln(Loan Amount)	0.047	0.283	0.000	0.000
	(1.111)	(1.116)	(0.000)	(0.000)
Secured Loan	24.305	23.490	-0.001	-0.000
	(16.677)	(16.547)	(0.001)	(0.001)
Number of CLO managers	0.197*	0.151	0.000***	0.000***
	(0.104)	(0.097)	(0.000)	(0.000)
Observations	3,462	3,462	3,452	3,452
Firm FE	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.844	0.841	0.378	0.378

This table explores the estimate of Equation (3) showing whether banks adjust loan spreads or raise additional funding to finance a green transition. *Loan Spread* is spread in basis points over LIBOR. *Green Loan* is an indicator taking a value of one if a bank includes sustainability-linked pricing provisions in the loan contract. *Securitization* takes on a value of one if a loan is securitized by banks, and 0 otherwise. *Higher Emitter* takes on a value of one if a firm has its emission intensity (Columns 1 and 3) or level (Columns 2 and 4) above the mean before Trump's election (i.e. from 2013 to 2015), and zero otherwise. *Intensity* is the ratio of a firm's total carbon emissions in tons over its revenue measured in thousand dollars. *Level* is the total carbon emissions that a borrower emits measured in tons of carbon dioxide. Other variables are defined in the Appendix. Standard errors are clustered at the bank level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 5: Heterogeneous effects across preferences and location

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Securitization					
Panel A: Treatment status based on Intensity						
	Bank ESG		UNEP member		Bank location	
	Rated	Non-rated	Joined	Not joined	US	Non-US
Higher Emitter × Trump	-0.072	-0.039***	-0.010	-0.040*	-0.043***	-0.003
	(0.074)	(0.008)	(0.017)	(0.020)	(0.014)	(0.048)
Observations	847	2615	1326	2136	2313	1149
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.913	0.873	0.928	0.873	0.872	0.926
Panel B: Treatment status based on Level						
	Bank ESG		UNEP member		Bank location	
	Rated	Non-rated	Joined	Not joined	US	Non-US
Higher Emitter × Trump	-0.096	-0.032***	-0.027	-0.037***	-0.037***	-0.015
	(0.082)	(0.009)	(0.016)	(0.012)	(0.009)	(0.056)
Observations	847	2615	1326	2136	2313	1149
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.913	0.873	0.928	0.873	0.872	0.926

This table explores how the effect of firms' transition risk on banks' securitization decisions after Trump's election depends on banks' green preferences and location. *Securitization* takes on a value of one if a loan is securitized by banks, and 0 otherwise. *Trump* indicates the period after Trump's election. *Higher Emitter* takes on a value of one if a firm has its emission intensity (Panel A) or level (Panel B) above the mean over the pre-shock period and zero otherwise. *Intensity* is the ratio of a firm's total carbon emissions in tons over its revenue measured in thousand dollars. *Level* is the total carbon emissions that a borrower emits measured in tons of carbon dioxide. The table splits the sample into green and non-green banks by banks' pre-shock ESG scores (Columns (1) to (2)) or their membership in the UNEP FI before 2016 (Columns (3) and (4)) or their location (Columns (5) and (6)). Column (1) encompasses only banks that have ESG scores and Column (2) encompasses only banks that have no ESG scores. Column (3) encompasses only banks that joined the UNEP FI before Trump's election and Column (4) that did not join at all or only after the election. Column (5) encompasses only banks with headquarters in the US, and Column (6) that are not in the US. Firm controls are included as their first lag and encompass size, ROA, equity, and capital expenditures. Loan controls comprise spread, maturity, logged loan volume, secured and the number of CLO managers. Standard errors are clustered at the bank level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 6: Heterogeneous effects across bank characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Securitization					
Treatment status based on	*Intensity*			*Level*		
Higher Emitter × Trump	-0.053***	-0.045***	-0.034***	-0.032***	-0.036***	-0.023**
	(0.013)	(0.012)	(0.011)	0.011)	(0.011)	(0.009)
Higher Emitter × High Capital	-0.025***			-0.011		
	(0.009)			(0.009)		
Trump × High Capital	-0.021***			-0.016**		
	(0.007)			(0.007)		
Higher Emitter × Trump × High Capital	0.033**			0.013		
	(0.016)			(0.011)		
Higher Emitter × High Deposit		-0.011			-0.042***	
		(0.014)			(0.014)	
Trump × High Deposit		-0.000			-0.001	
		(0.012)			(0.012)	
Higher Emitter × Trump × High Deposit		0.035*			0.032**	
		(0.017)			(0.015)	
Higher Emitter × Large Bank			0.024**			0.006
			(0.010)			(0.007)
Trump × Large Bank			0.015			0.015
			(0.016)			(0.019)
Higher Emitter × Trump × Large Bank			-0.029***			-0.023**
			(0.009)			(0.011)
Observations	3,097	2,363	3,188	3,097	2,363	3,188
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.893	0.874	0.895	0.893	0.874	0.895

This table explores how banks' characteristics interact with the link between the propensity to securitize and firms' environmental performance. *Securitization* takes on a value of one if a loan is securitized by banks, and 0 otherwise. *Trump* indicates the period after Trump's election. *Higher Emitter* takes on a value of one if a firm has its emission intensity (Columns 1 to 3) or level (Columns 4 to 6) above the mean over the pre-shock period and zero otherwise. *Intensity* is the ratio of a firm's total carbon emissions in tons over its revenue measured in thousand dollars. *Level* is the total carbon emissions that a borrower emits measured in tons of carbon dioxide. *High Capital (Deposit) or Large Bank* takes on a value of one if a bank has its own capital (deposit) or size above the median over the pre-shock period and zero otherwise. Firm controls are included as their first lag and encompass size, ROA, equity, and capital expenditures. Loan controls comprise spread, maturity, and logged loan volume, secured and the number of CLO managers. Standard errors are clustered at the bank level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 7: External validity

	(1)	(2)	(3)	(4)
	Dependent variable: Securitization			
	Withdrawal		Paris Agreement	
Treatment status based on	*Intensity*	*Level*	*Intensity*	*Level*
Higher Emitter × Exit Paris Agreement	-0.047***	-0.034***		
	(0.013)	(0.010)		
Higher Emitter × Paris Agreement			0.199***	0.154***
			(0.046)	(0.045)
Observations	3,462	3,462	2,813	2,813
Sample	US	US	Europe	Europe
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.886	0.949	0.886	0.949

This table explores the effect of firms' exposure to carbon transition risk on banks' securitization decisions after the withdrawal from the Paris Agreement of the US using the main sample (Columns 1 and 2) or after the Paris Agreement on the basis of a sample that comprises only European firms (Columns 3 and 4). *Securitization* takes on a value of one if a loan is securitized by banks, and 0 otherwise. *Higher Emitter* takes on a value of one if a firm has its emission intensity (Columns 1 and 3) or level (Columns 2 and 4) above the mean over the pre-shock period and zero otherwise. *Intensity* is the ratio of a firm's total carbon emissions in tons over its revenue measured in thousand dollars. *Level* is the total carbon emissions that a borrower emits measured in tons of carbon dioxide. Firm controls are included as their first lag and encompass size, ROA, equity, and capital expenditures. Loan controls comprise spread, maturity, logged loan volume, secured and the number of CLO managers. Standard errors are clustered at the bank level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 8: Pricing of carbon transition risk in securitization markets

	(1)	(2)	(3)	(4)
	Dependent variable: Transaction Price			
	Purchase		Sales	
Treatment status based on	*Intensity*	*Level*	*Intensity*	*Level*
Higher Emitter× Trump	-0.060	0.258	0.819	0.787
	(0.443)	(0.429)	(0.549)	(0.507)
Trump	0.681**	0.639*	-0.483	-0.501
	(0.334)	(0.340)	(0.461)	(0.455)
A3	0.301	0.262	-0.447***	-0.459***
	(0.246)	(0.247)	(0.128)	(0.175)
B3	-0.189	-0.206	-0.010	-0.009
	(0.196)	(0.195)	(0.441)	(0.442)
C	-1.033**	-1.039**	-1.145**	-1.141**
	(0.508)	(0.510)	(0.536)	(0.540)
NR	0.208**	0.187**	-0.393	-0.392
	(0.093)	(0.090)	(0.382)	(0.381)
Observations	17,258	17,258	13,882	13,882
Firm FE	Yes	Yes	Yes	Yes
CLO-Time FE	Yes	Yes	Yes	Yes
Industry-Time FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.497	0.498	0.675	0.675
Clustering	CLO	CLO	CLO	CLO

This table examines (1) if CLOs price transition risk in their purchases of syndicated loans (Columns 1 and 2) or (2) if investors buying securities from CLOs charge carbon premia (Columns 3 and 4) using data from Creditflux CLO-i. *Transaction Price* is the transaction price of CLO transactions. *Trump* indicates the period after Trump's election. *Higher Emitter* takes on a value of one if an issuer of CLOs has its emission intensity (Columns 1 to 3) or level (Columns 4 to 6) above the mean over the pre-shock period and zero otherwise. *Intensity* is the ratio of an issuer's total carbon emissions in tons over its revenue measured in thousand dollars. *Level* is the total carbon emissions that an issuer of CLOs emits measured in the natural logarithm of tons of carbon dioxide. A3, B3, C, NR are Moody's ratings reported in Creditflux CLO-i. Standard errors are clustered at the CLO level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 9: Banking deregulation under the Trump administration

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Securitization					
Panel A: Treatment status based on Intensity						
Higher Emitter × Trump	-0.039***	-0.037***	-0.034***	-0.035***	-0.035***	-0.042***
	(0.012)	(0.009)	(0.011)	(0.011)	(0.011)	(0.011)
Trump × High Capitals	-0.013**					
	(0.007)					
Trump × High Liquid Assets		0.006				
		(0.012)				
Trump × High Deposits			0.010			
			(0.011)			
Trump × Above 250 bil.				-0.032*		
				(0.018)		
Trump × 100-250 bil.					0.022	
					(0.019)	
Trump × G-SIB						0.005
						(0.011)
Panel B: Treatment status based on Level						
Higher Emitter × Trump	-0.027***	-0.023***	-0.027***	-0.024**	-0.024**	-0.027***
	(0.009)	(0.007)	(0.010)	(0.009)	(0.009)	(0.008)
Trump × High Capitals	-0.013**					
	(0.006)					
Trump × High Liquid Assets		0.007				
		(0.012)				
Trump × High Deposits			0.010			
			(0.011)			
Trump × Above 250 bil.				-0.033*		
				(0.018)		
Trump × 100-250 bil.					0.022	
					(0.018)	
Trump × G-SIB						0.004
						(0.011)
Observations	3,097	3,331	2,363	3,188	3,188	3,462
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.893	0.893	0.874	0.895	0.895	0.893

This table examines changes in securitization decisions due to banking deregulation that happened during Trump's administration. *Securitization* takes on a value of one if a loan is securitized by banks, and 0 otherwise. *Trump* indicates the period after Trump's election. *Higher Emitter* takes on a value of one if a firm has its emission intensity (Panel A) or level (Panel B) above the mean over the pre-shock period and zero otherwise. *High Capitals (Deposits or Liquid Assets)* takes on a value of one if a bank has its own capitals (deposits or liquid assets) or size above the median over the pre-shock period and zero otherwise. *Above 250 bil. or 100-250 bil.* takes on a value of one if banks' total assets are above $250 bil. (or from $100 to $250 bil.). *G-SIB* is a dummy equal to 1 if banks are G-SIB banks. Firm controls are included as their first lag and encompass size, ROA, equity, and capital expenditures. Loan controls comprise spread, maturity, and logged loan volume, secured and the number of CLO managers. Standard errors are clustered at the bank level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 10: Borrowers' credit risk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Securitization							
Treatment status based on	*Intensity*				*Level*			
Higher Emitter × Trump	-0.045***	-0.043***	-0.043***	-0.042***	-0.037***	-0.036***	-0.036***	-0.034***
	(0.012)	(0.012)	(0.012)	(0.010)	(0.009)	(0.010)	(0.011)	(0.009)
No rating	-0.060***				-0.062***			
	(0.016)				(0.017)			
No rating × Trump	-0.016				-0.013			
	(0.013)				(0.014)			
Secured ×Trump		0.032				0.028		
		(0.030)				(0.030)		
SA index			0.073				0.085	
			(0.158)				(0.161)	
SA index× Trump			-0.001				-0.001	
			(0.002)				(0.002)	
Z-score				-0.021**				-0.021**
				(0.010)				(0.009)
Z-score× Trump				-0.004				-0.002
				(0.003)				(0.003)
Observations	3,462	3,462	3,462	3,330	3,462	3,462	3,462	3,330
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.887	0.886	0.886	0.884	0.887	0.886	0.886	0.884

This table reports results showing whether the effect of firms' transition risk on banks' securitization decisions after Trump's election due to borrowers' credit risk. *Securitization* takes on a value of one if a loan is securitized by banks, and 0 otherwise. *Trump* indicates the period after Trump's election. *Higher Emitter* takes on a value of one if a firm has its emission intensity (Columns 1 to 3) or level of carbon emissions (Columns 4 to 6) above the mean over the pre-shock period and zero otherwise. *Intensity* is the ratio of a firm's total carbon emissions in tons over its revenue measured in thousand dollars. *Level* is the total carbon emissions that a borrower emits measured in tons of carbon dioxide. *No rating* is a dummy variable equal to one if there are no S&P credit ratings. *SA index* is Size-Age Index by Hadlock and Pierce (2010). *Z-score* index is based on Altman (1968). Firm controls are included as their first lag and encompass size, ROA, equity, and capital expenditures. Loan controls comprise spread, maturity, and logged loan volume, secured and the number of CLO managers. Firm controls are included as their first lag and encompass size, ROA, equity, and capital expenditures. Loan controls comprise spread, maturity, logged loan volume, secured and the number of CLO managers. Standard errors are clustered at the bank level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 11: Alternative measures of carbon transition risk

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Securitization					
Trump × Pre-shock Emission Intensity	-0.003**					
	(0.002)					
Trump × Pre-shock Emission		-0.623**				
		(0.278)				
Pre-shock Scope 1 Intensity × Trump			-0.047***			
			(0.015)			
Pre-shock Scope 1 × Trump				-0.038***		
				(0.014)		
Lower ESG × Trump					-0.082***	
					(0.025)	
Higher Rrisk × Trump						-0.030**
						(0.015)
Observations	3462	3462	3264	3264	3426	3320
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.886	0.886	0.897	0.897	0.889	0.889

This table reports estimates of Equation (2) and explores whether our findings are sensitive to the definition of firms' exposure to transition risk. *Securitization* takes on a value of one if a loan is securitized by banks, and 0 otherwise. *Trump* indicates the period after Trump's election. *Pre-shock Emission (Scope 1) Intensity* is the average of the ratio of a firm's total carbon emissions (Scope 1) in tons over its revenue measured in thousand dollars before the pre-shock period. *Pre-shock Emission (Scope 1)* is the average of total carbon emissions that a borrower emits measured in the natural logarithm of tons of carbon dioxide (Scope 1 emission) before the pre-shock period. In Column (4), Lower ESG score equals 1 if a firm's ESG score is lower than average, 0 otherwise. In Column (5), Higher Rrisk receives a value of 1 if a firm's regulatory risk index suggested by Sautner et al. (2022) is higher than average, 0 otherwise. Firm controls are included as their first lag and encompass size, ROA, equity, and capital expenditures. Loan controls comprise spread, maturity, logged loan volume, secured and the number of CLO managers. Standard errors are clustered at the bank level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Figures

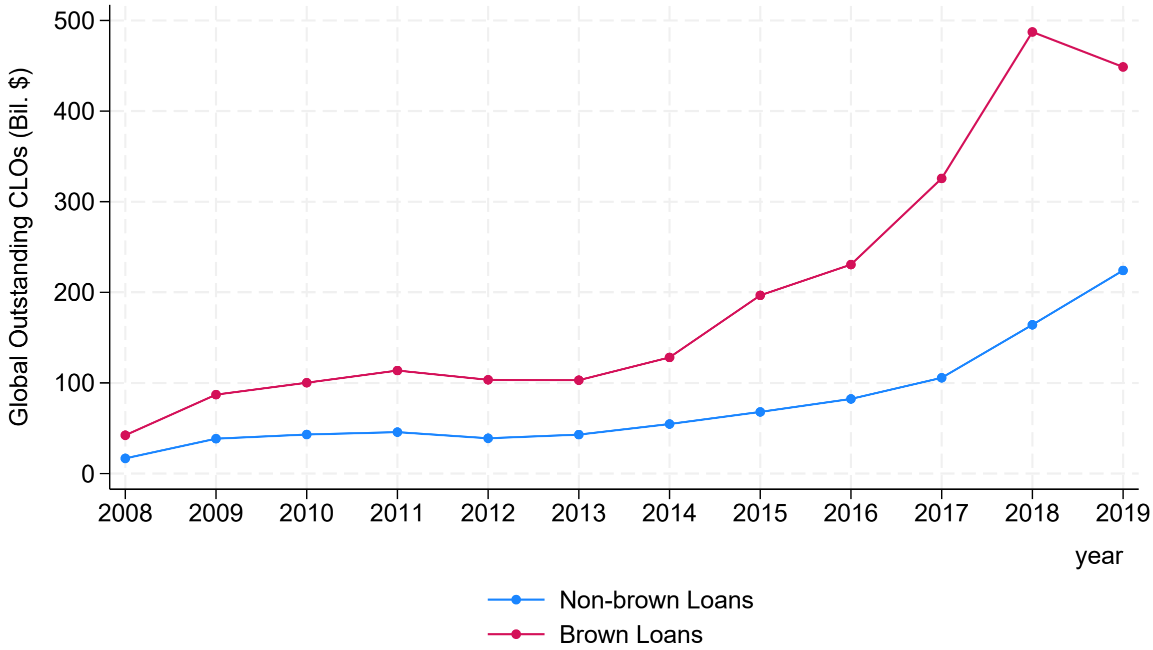

Figure 1: Outstanding leveraged loans held by CLOs globally

Note: This figure depicts the amount of outstanding leveraged loans that CLOs hold globally between 2008 and 2019 while differentiating between brown and non-brown loans. Data is from Credit Flux CLO-i. Due to the absence of carbon emissions reporting by a number of firms, to provide an overview picture of CLOs markets, we follow Bolton and Kacperczyk (2022) and classify a loan as a brown one if its industry is a carbon-intensive industry. These industries are: Automobile, Oil and Gas, Utilities; Cargo Transport; Mining, Chemicals, Plastic, and Rubber; Personal Transportation, and Manufacturing.

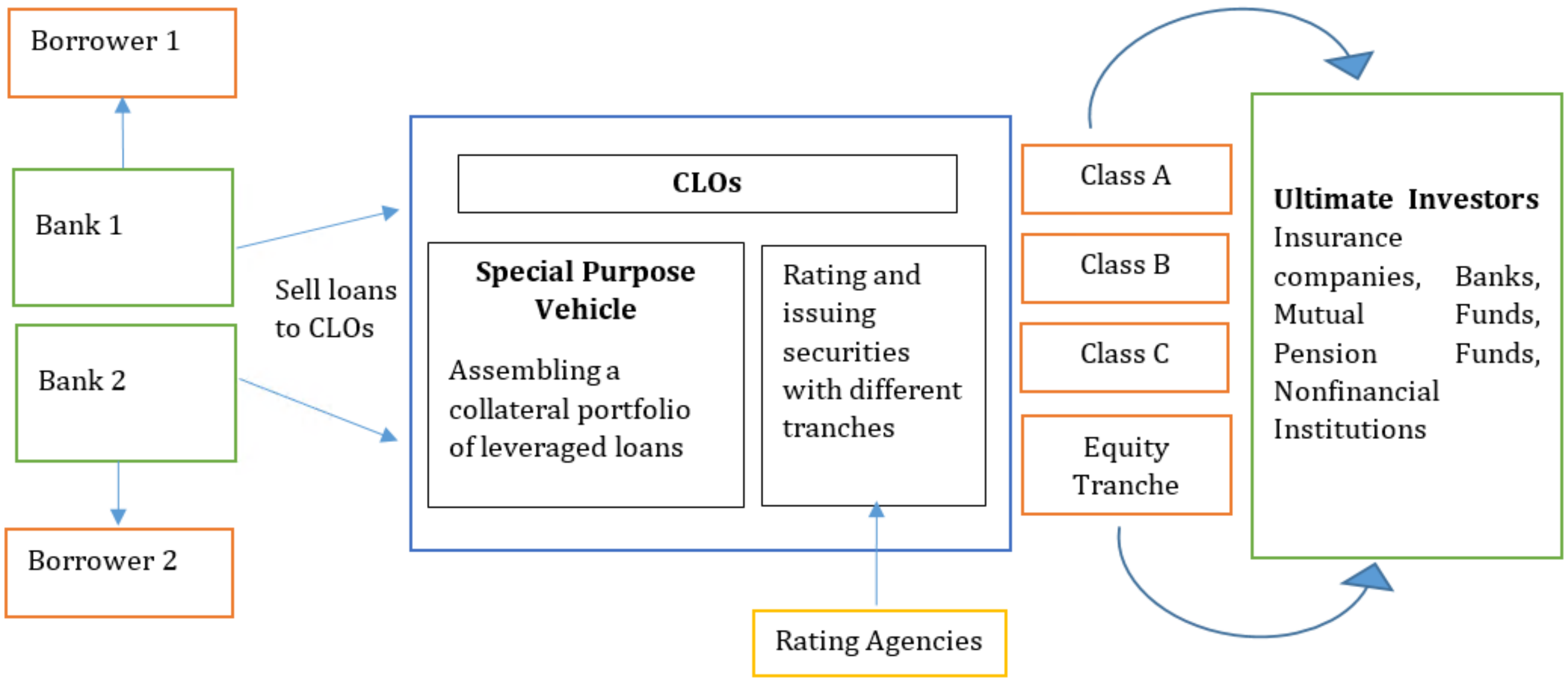

Figure 2: Structure of CLOs

Note: This figure illustrates the securitization process of corporate loans involving borrowers, banks, CLOs, rating agencies, and ultimate investors.

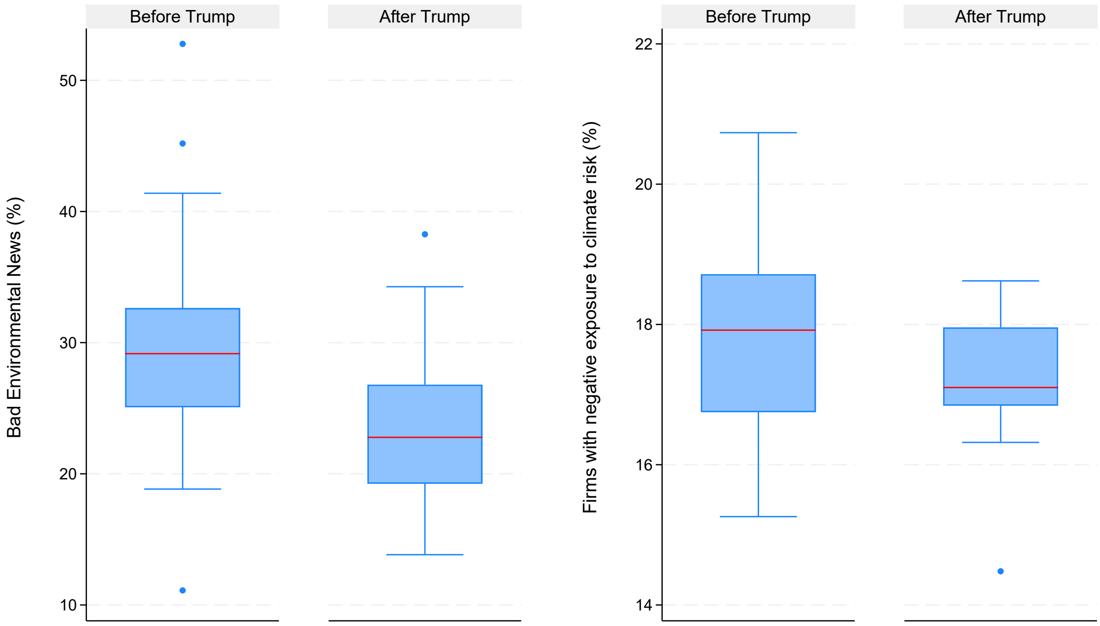

Figure 3: Changes in carbon transition risk around Trump's election

Note: This figure illustrates the percentage of bad environmental news over total ESG news for US firms on a monthly basis between January 2014 and January 2021 and the fraction of firms with negative exposure to climate risk. The bad environmental news data is from RepRisk, a data provider that screens daily over 80,000 media, stakeholder, and third-party sources as well as social media for news related to firms' ESG practices since 2007. The negative exposure to climate risk data is the climate risk index of Sautner et al. (2022) between 2013 and 2019.

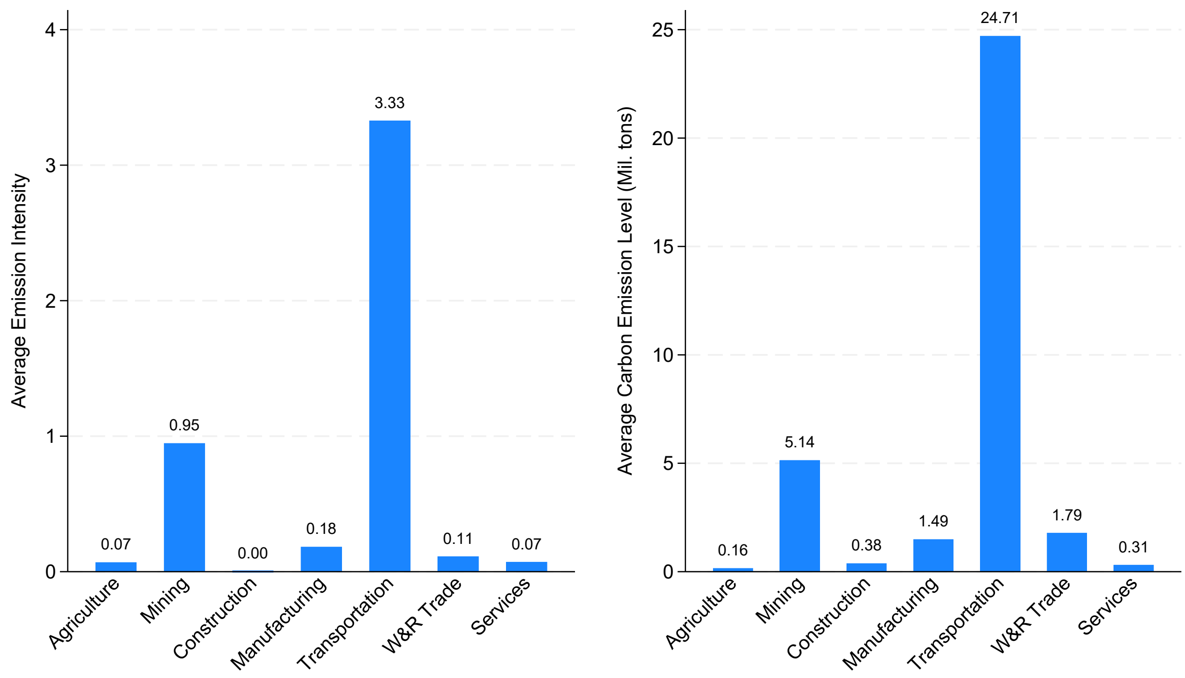

Figure 4: The level and intensity of carbon emissions across industries

Note: This figure reports average carbon emission intensity (measured in tons over thousand dollar revenue) and carbon emission level (measured in million tons) across the 7 main industries in our sample.

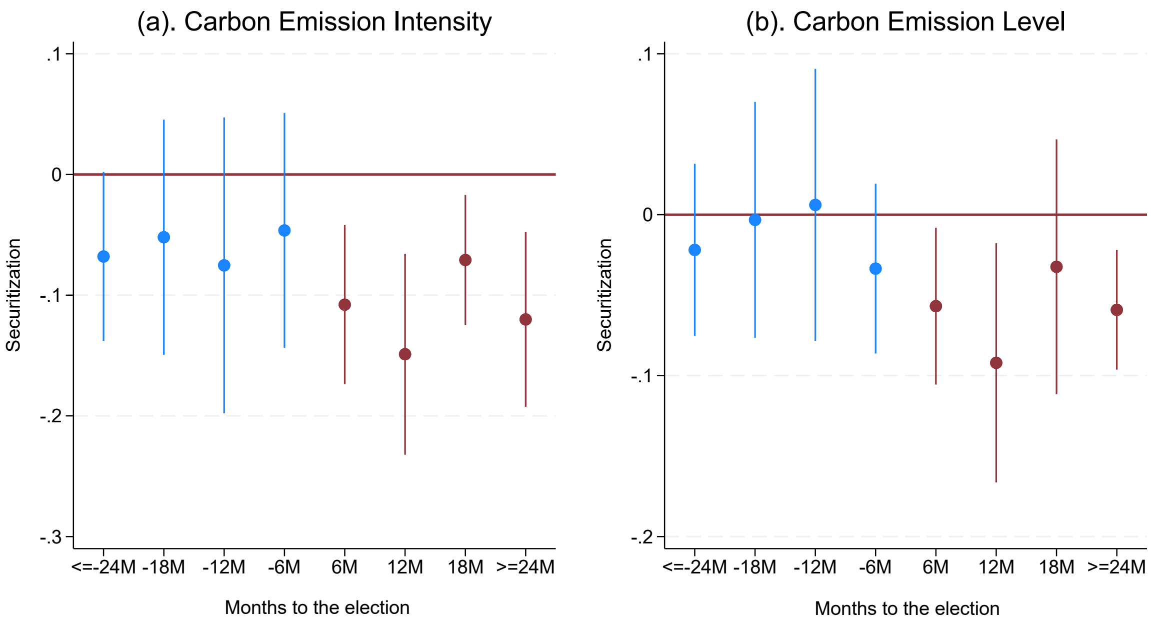

Figure 5: Dynamic effects

Note: This figure illustrates the semi-annual treatment effects for the periods before and after Trump's election. To this end, we estimate Equation (2) but interact *Higher Emitter* with a set of quarter dummies using 2016Q4 as the reference. *Securitization* takes on a value of one if a loan is securitized by banks, and 0 otherwise. 90% confidence intervals are displayed.

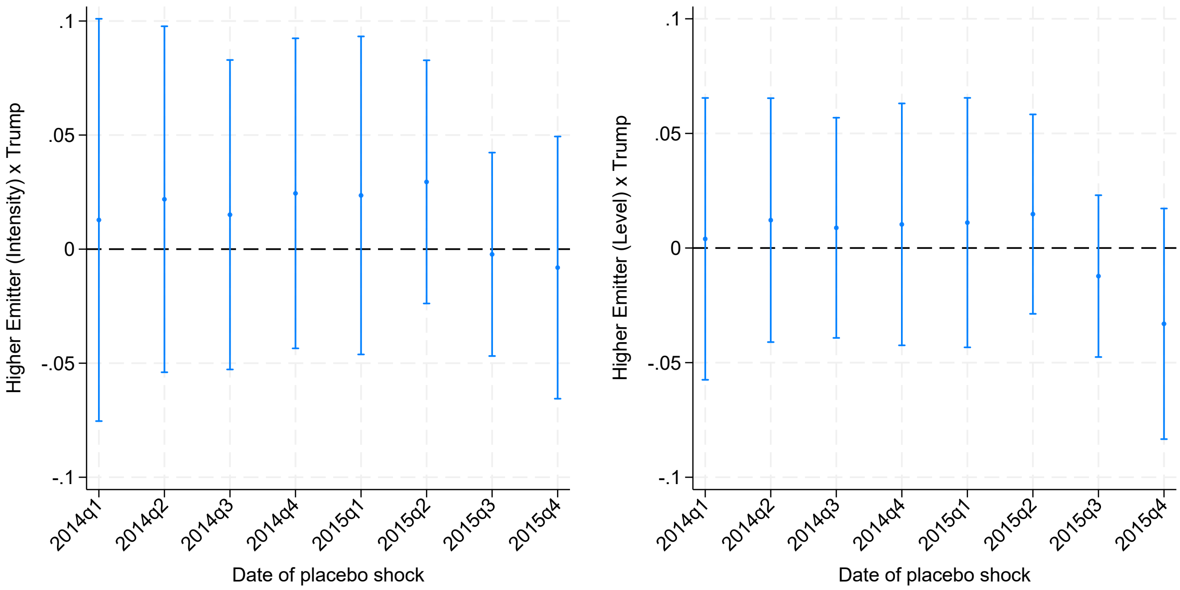

Figure 6: Placebo exercise

Note: This figure illustrates the results of several placebo tests in which the shock under study is simulated to take place at different points in time during the pre-shock period from 2013Q1 until 2016Q3. For each test that is simulated to take place in each quarter between 2014Q1 and 2015Q5, the estimated coefficient $Higher\ Emitter \times Trump$ and 90% confidence bands are plotted.

Appendix

Table A1: Variable definitions

Variable	Description	Source
Panel A: Loan characteristics		
Securitization	Dummy that is equal to one if the syndicated loan gets sold in secondary markets.	DealScan CLO-i Creditflux
Loan Maturity	Loan maturity in years	DealScan
Loan Spread	Spread in basis points over Libor	DealScan
Loan Amount	Loan amount in US$ million	DealScan
Trump	A dummy variable that takes on a value of one between 2016Q4 and 2019Q4 and zero otherwise	
Secured Loan	Dummy that equals one if a loan is secured and zero otherwise	DealScan
No. CLO Managers	The number of CLO managers	CLO-i Creditflux
Panel B: Firm characteristics		
Emission Intensity	Total Carbon Emission of a firm divided by its total revenue	Refinitiv
Emission	Total carbon emission	Refinitiv
Higher Emitter	Dummy that is equal to one if firms' emission intensities (or emission) between 2013 and 2015 is above mean and zero otherwise	Refinitiv
Pre-shock Emission Intensity	Total carbon emission of a firm divided by its total revenue between 2013 and 2015	Refinitiv
Pre-shock Emission	Total carbon emission between 2013 and 2015	Refinitiv
Pre-shock Scope 1 Intensity	Total scope 1 carbon emission of a firm divided by its total revenue between 2013 and 2015	Refinitiv
Pre-shock Scope 1 Emission	Total scope 1 carbon emission of a firm between 2013 and 2015	Refinitiv
Lower ESG Score	Dummy that is equal to one if a firm' ESG score is lower than average during the pre-shock period and zero otherwise	Refinitiv

Table A1: Variable definitions

Variable	Description	Source
Higher Rrisk	Dummy that is equal to one if a firm's regulatory risk is higher than average during the pre-shock period and zero otherwise	Sautner et al. (2022)
Firm Total Assets	Total assets in billion US Dollars	Worldscope
Firm Size	Log of total assets	Worldscope
Firm ROA	Net income divided by total assets	Worldscope
Firm Equity	Common equity divided by total assets	Worldscope
Firm Capex	Capital expenditures divided by total assets	Worldscope
Firm Tax Rate	Tax rate	Worldscope
Tradeable	Dummy that is equal to one if firms belong to the tradeable sector and zero otherwise	DealScan
Firm G Score	The Governance Score of a firm	Refinitiv
SA Index	Size-age index defined in accordance with Hadlock and Pierce (2010)	Worldscope
No rating	Dummy that is equal to one if a borrower has credit ratings	S&P Capital IQ
Z-score	Altman's Zscore	Worldscope
Panel C: Bank characteristics		
Joined UNEP	Dummy that is equal to one if banks joined the UNEP FI before the 2016 election	UNEP FI
Rated ESG Score	Dummy that is equal to one if banks have an ESG score	Refinitiv
US Bank	Dummy that is equal to one if banks have their headquarters in the United States	Compustat
High Bank Capital	Dummy that is equal to one if banks have a pre-shock capital ratio above the median and zero otherwise	Compustat
High Bank Size	Dummy that is equal to one if banks' pre-shock size is larger than the median and zero otherwise	Compustat
Bank Total Assets	Total assets in billion US Dollars	Compustat
Bank Size	Log of total assets	Compustat
Bank Equity	Total equity divided by total assets	Compustat
Bank ROA	Income before tax divided by total assets	Compustat
Bank Deposit	Total deposits divided by total assets	Compustat

Table A2: Loan Demand from High Carbon Emitters

	(1)	(2)
	Dependent variable: *New Bank Loan*	
Treatment status based on	Carbon Emission Intensity	Carbon Emission Level
Trump	0.002	0.003
	(0.023)	(0.023)
High Emitter × Trump	0.005	0.000
	(0.021)	(0.019)
Firm Size	-0.013	-0.013
	(0.021)	(0.021)
Firm ROA	0.000	0.000
	(0.001)	(0.001)
Firm Equity	0.000	0.000
	(0.000)	(0.000)
Firm Capex	0.011	0.011
	(0.007)	(0.007)
Observations	8,438	8,438
Firm FE	Yes	Yes
Time FE	Yes	Yes
Adjusted R^2	0.022	0.022

This table explores whether high carbon emitters raise new bank loans after Trump's election. *New Bank Loan* takes on a value of one if a new bank loan is originated to firm f, and 0 otherwise. *Higher Emitter* takes on a value of one if a firm has its emission intensity (Columns 1) or level (Columns 2) above the mean before Trump's election (i.e. from 2013 to 2015), and zero otherwise. *Intensity* is the ratio of a firm's total carbon emissions in tons over its revenue measured in thousand dollars. *Level* is a borrower's total carbon emissions measured in tons of carbon dioxide. Other variables are defined in the Appendix A1. Standard errors are clustered at the firm level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table A3: Carbon Transition Risk and the Involvement of Other Non-bank Participants

	(1)	(2)	(3)	(4)
Dependent variable:	*Non-bank participants*			
Treatment status based on	*Intensity*	*Level*	*Intensity*	*Level*
Carbon Emission	-0.059*	-0.006		
	(0.035)	(0.012)		
High Emitter × Trump			0.061*	0.061
			(0.035)	(0.041)
Observations	3,462	3,462	3,462	3,462
Firm FE	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.655	0.655	0.655	0.655

This table reports the probability that lead banks include non-bank non-CLO participants when borrowers' carbon footprint changes. *Non-bank participants* takes a value of one if a loan has at least one non-bank participant that is not a CLO manager. *Trump* indicates the period after Trump's election. *Carbon Emissions* can be either the *Carbon Emission Intensity* or *Carbon Emission Level* of a borrower. *Intensity* is the ratio of a firm's total carbon emissions in tons over its revenue measured in thousand dollars reported in Columns 1 and 3. *Level* is the total carbon emissions that a borrower emits measured in the natural logarithm of tons of carbon dioxide reported in Columns 2 and 4. *Higher Emitter* takes on a value of one if a firm has its emission intensity above the mean before Trump's election (i.e. from 2013 to 2015), and zero otherwise. Firm Controls include *Firm Size*, *Firm ROA*, *Firm Equity*, and *Firm Capex*. Loan Controls include *Loan Maturity*, *Loan Spread*, and *Ln(Loan Amount)*. and whether the loan is secured. All variables are defined in the Appendix A1. Standard errors are clustered at the bank level and reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table A4: Other confounding factors

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependend variable: Securitization					
	Carbon Emission Intensity			Carbon Emission Level		
Higher Emitter × Trump	-0.017*	-0.040***	-0.017***	-0.018*	-0.033**	-0.017***
	(0.010)	(0.015)	(0.006)	(0.010)	(0.013)	(0.006)
Firm Tax Rate	0.000			0.000		
	(0.000)			(0.000)		
Firm Tax Rate ×Trump	0.003***			0.003***		
	(0.001)			(0.001)		
Tradable × Trump		0.006			0.009	
		(0.011)			(0.012)	
G-index ×Trump			0.129			0.092
			(0.080)			(0.088)
Observations	2,687	3,462	2,251	2,687	3,462	2,251
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.891	0.886	0.889	0.891	0.886	0.889

This table reports estimates of Equation (2) controlling for other confounding factors that may drive banks' securitization activities after Trump's election, such as tax policy, trade policy, and corporate governance. All variables are in the appendix A1. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table A5: Further robustness checks on anticipation and clustering

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Securitization							
	Carbon Emission Intensity				Carbon Emission Level			
	Wo2016	Wo2019	Cluster	Cluster	Wo2016	Wo2019	Cluster	Cluster
Higher Emitter × Trump	-0.047***	-0.028**	-0.042***	-0.042***	-0.041***	-0.035***	-0.038***	-0.038**
	(0.009)	(0.012)	(0.015)	(0.014)	(0.010)	(0.013)	(0.012)	(0.016)
Observations	2,854	2,810	3,264	3,264	3,039	3,007	3,500	3,500
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.904	0.898	0.897	0.897	0.899	0.892	0.888	0.888
Clustering	Bank	Bank	Bank-Time	Bank, Ind	Bank	Bank	Bank-Time	Bank, Ind

This table reports estimates of Equation (2) controlling for anticipation effects and different methods of clustering standard errors. Standard errors are clustered as indicated and reported in parentheses. All variables are defined in the appendix. Firm Controls include *Firm Size*, *Firm ROA*, *Firm Equity*, and *Firm Capex*. Loan Controls include *Loan Maturity*, *Loan Spread*, *Ln(Loan Amount)*, *Number of CLO managers* and whether the loan is secured. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

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