Hurricane Risk and Debt Contracts

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Abstract

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Keywords: Financial contracts, hurricane risk, storm events

JEL: G21, G23

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Abstract

The rising frequency and costs of hurricanes raise concerns about financial stability. However, little is known about the specific impact of hurricane risk on firms' financial policies, including financing strategies and borrowing terms. This study analyzes debt contracts of U.S. firms affected by hurricanes causing over $1 million in property damage. By comparing loan terms before and after hurricanes and examining cross-sectional variations in borrowers, lenders, loan types, and macroeconomic conditions, we assess the impact of hurricane-related risks on corporate borrowing. These findings inform lenders' role in managing hurricane risks, aiding policymaking and enhancing companies' disaster preparedness.

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1 Introduction

Hurricanes are natural disasters that pose significant threats to businesses, communities, and economies. The increasing frequency and costs of hurricanes have raised concerns about financial stability and the ability of firms to withstand and recover from these destructive events. While the impact of hurricanes on physical infrastructure and economic productivity has been well-documented, little is known about the specific effects of hurricane risk on firms' financial policies, particularly their borrowing decisions and loan terms.

Understanding how hurricane-related risks influence corporate borrowing is crucial for lenders, policymakers, and companies themselves. Lenders need insights into how to manage and assess the risks associated with lending to firms exposed to hurricane-prone regions. Policymakers require a clear understanding of the financial implications of hurricanes to develop effective disaster response and recovery strategies. Furthermore, companies can benefit from understanding how hurricanes impact their financing options and terms, allowing them to enhance their disaster preparedness and risk management strategies.

This study aims to fill this gap in the literature by analyzing the debt contracts of U.S. firms affected by hurricanes causing significant property damage. By comparing loan terms before and after hurricanes and examining various factors such as borrower characteristics, lender types, loan types, and macroeconomic conditions, we assess the impact of hurricane-related risks on corporate borrowing. In addition, we focus on the effects of hurricanes on loan amendment and renegotiation outcomes, including changes in loan amount, loan maturity, and deal spread.

To investigate the impact of hurricane-related risks on corporate borrowing, we employ a comprehensive dataset of debt contracts of U.S. firms affected by hurricanes causing over $1 million in property damage. The dataset allows us to examine the loan terms before and after hurricanes, enabling a direct assessment of changes in financing strategies and borrowing terms in response to these natural disasters. We also consider cross-sectional variations

in borrower characteristics, lender types, loan types, and macroeconomic conditions to understand the factors that influence the response of firms and lenders to hurricane-related risks.

Our analysis reveals several key findings regarding the impact of hurricane-related risks on corporate borrowing and sheds light on the financial policies adopted by firms in the face of hurricanes. Firstly, the analysis of the impact of hurricanes on six loan term characteristics, covenant inclusion, loan size, maturity, syndicated, secured, and spread shows that hurricanes lead to an increase in the number of covenants in loan contracts, reflecting lenders' response to heightened risk. There is also an increase in loan sizes, indicating lenders' willingness to provide additional funds for recovery efforts. Loan maturity decreases, demonstrating lenders' cautious approach in response to uncertainty. Loan syndication and demand for secured credit both increase, reflecting risk mitigation measures. Furthermore, loan spreads rise, compensating lenders for the elevated risk associated with hurricanes. These findings shed light on the financial decisions made by borrowers and lenders after hurricane events and contribute to a better understanding of the impact on firms' financial policies.

The analysis of borrower characteristics in relation to the impact of storms on loan terms reveals several key findings. First, the effects of storms on loan terms vary across different percentiles of firm size. Small firms experience tighter loan restrictions and demand larger loans after a storm event, while the impact diminishes for larger firms. Second, the market-to-book ratio of firms also plays a significant role. Storm events lead to tighter loan restrictions, larger loans, increased involvement of multiple lenders, and greater demand for secured loans. Firms with low market-to-book ratios, which rely heavily on tangible capital, are less affected by storms compared to firms with high market-to-book ratios. Third, leverage levels have a consistent impact on loan terms. Storms result in tighter loan restrictions and larger loans, regardless of a firm's leverage. Highly leveraged firms experience a reduction in loan maturity, and their borrowing tends to come from known sources rather than syndication. Fourth, asset tangibility influences loan terms in a similar manner to the

market-to-book ratio, with physical assets playing a role in preventing tighter loan terms after a storm event. Finally, the analysis reveals that the effects of storms on loan spreads are generally positive, indicating increased borrowing costs for firms at lower percentiles of asset tangibility and market-to-book ratio. These findings provide valuable insights into how borrower characteristics interact with storm events to shape loan terms.

The analysis on the impact of a storm event on loan terms reveal significant differences in the approaches taken by different types of lenders in hedging risks associated with post-storm loans. Regardless of the lender type, all three types of banks (commercial banks, securities firms, and other lenders) show a significant increase in the inclusion of covenants in loan agreements after a storm event. Commercial banks and other lenders tend to increase the supply of funds available to firms after a storm event, as evidenced by significant effects on loan size. Only other lenders show a significant reduction in loan maturity, indicating a higher likelihood of shorter loan maturities in response to a storm event. Commercial banks demonstrate a significant increase in syndicated loans, suggesting a higher propensity to involve other banks in loan syndication during a storm event. There are also significant differences in the requirements for secured loans between commercial banks and securities firms or other lenders, with the latter exhibiting stronger effects. Additionally, commercial banks charge higher spreads on loans after a storm event, while other lenders offer loans at lower spreads. These findings highlight the diverse risk mitigation strategies employed by different types of lenders in response to a storm event and underscore the role of lender characteristics in shaping loan terms.

The analysis of the interaction between the storm event and pre-existing borrower-lender relationships reveals that lenders responded differently based on the relationship status. Borrowers without a relationship experienced a greater increase in covenants, loan size, and Secured requirements compared to those with a relationship. On the other hand, borrowers with an established relationship saw a greater decrease in loan maturity but a larger increase in loan syndication. Credit spread also had significant effects on loan terms, with higher

spreads leading to increased likelihoods of including covenants and larger loan sizes. Term spread had similar effects, but with some variations across percentiles. These findings provide insights into the different approaches and influences of lenders and macroeconomic factors on loan terms in the aftermath of a storm event.

The analysis on other loan features after a storm event reveals several core findings. Firstly, there is a significant positive effect on performance pricing, indicating that lenders adjust loan pricing in response to the event. However, the effects on other loan features such as credit line, upfront fee, number of lenders, and required lenders are not statistically significant. Secondly, when considering lead bank type, commercial banks show a positive effect on performance pricing, while security firms do not exhibit significant effects on most loan characteristics. Other lenders, however, show significant effects on performance pricing and credit line. Thirdly, in terms of relationship lending, transactional relationships have a stronger impact on performance pricing and credit line availability compared to relationship lending. Lastly, storm events have significant effects on market segment selection, with increased preferences observed for institutional, leveraged, highly leveraged, and non-investment-grade segments. However, no significant effect is observed on the covenant lite segment.

The analysis of market segment selection provides further insights. The results indicate that storm events have a positive impact on the selection of institutional, leveraged, highly leveraged, and non-investment-grade segments. Commercial banks and security firms exhibit increased preferences for these segments, while other lenders show mixed results. In terms of relationship lending, storm events increase the inclination towards these segments in transactional relationships. Furthermore, storm events also influence market segment selection in the middle market, with increased preferences for the US middle market, US traditional middle market, and US large middle market segments. However, a negative effect is observed on the project finance segment. Commercial banks and security firms show increased preferences for middle market segments, while relationship lending has a relatively weaker

impact on market segment selection.

We also find that hurricanes significantly increase the likelihood of deal amendment, indicating that these natural disasters trigger a higher probability of renegotiation. This can be attributed to the need for adjustments in response to the storm's impact, such as reassessing risk or addressing funding needs arising from storm-related damages or recovery efforts. Moreover, hurricanes lead to a greater number of amendments and changes in loan amount. This suggests that firms affected by hurricanes not only engage in renegotiation activities but also make substantial adjustments to the terms and conditions of their loan agreements. The increased number of amendments reflects the complexity and magnitude of the challenges faced by these firms in the aftermath of a storm. When examining the outcomes of renegotiation, we find that hurricanes influence the decision-making process and lead to alterations in loan amounts involved. The changes in loan amount signify the reassessment of risk or funding needs in response to the storm's impact. Firms may require additional financing to address storm-related damages or support recovery efforts, leading to larger loan amounts for renegotiated deals. Furthermore, our analysis considers the influence of different lead bank types on the impact of hurricanes on loan amendment and renegotiation outcomes. We find that commercial banks are more likely to engage in renegotiation activities and make increases to loan amounts following a storm event. This suggests that commercial banks are more responsive to the risks posed by hurricanes and play a crucial role in supporting firms affected by these natural disasters. On the other hand, security firms show smaller and non-significant effects in relation to storm events and renegotiation outcomes, indicating that they may be less influenced by storm events when it comes to making amendments during the renegotiation process. Additionally, we examine the impact of storm events on renegotiation outcomes based on relationship dynamics. Our findings reveal that storm events have a significant effect on certain renegotiation outcomes for both transactional and relationship lenders. Transactional lenders are more likely to amend deals and initiate multiple amendments following storm events. However, storm events do not

significantly affect changes in loan maturity or loan amount for transactional lenders. In contrast, storm events significantly impact changes and increases in loan amount for relationship lenders, indicating their responsiveness to the financial needs of firms affected by hurricanes.

This study contributes to the literature by providing novel empirical evidence on the impact of hurricane-related risks on corporate borrowing decisions and loan terms. The findings highlight the significant influence of hurricanes on loan amendment and renegotiation outcomes, with implications for deal terms, loan amount, and lender responsiveness. The results underscore the importance of lenders in managing hurricane risks and assisting firms in their recovery and rebuilding efforts. Moreover, the findings contribute to policymaking by informing disaster response and recovery strategies, enabling policymakers to better understand the financial implications of hurricanes on corporate borrowing. The insights gained from this study can aid in the development of policies and initiatives aimed at enhancing financial stability and resilience in hurricane-prone regions. For businesses, understanding how hurricanes influence their financing options and terms is crucial for developing robust risk management strategies and enhancing their disaster preparedness. The findings of this study provide valuable insights into the financial policies adopted by firms affected by hurricanes, enabling them to make informed decisions regarding their borrowing strategies and loan terms. Overall, this research enhances our understanding of financial policies in the face of hurricane risks, contributing to financial stability, informed decision-making by lenders and policymakers, and the resilience of businesses in hurricane-prone regions. By analyzing the specific impact of hurricane-related risks on corporate borrowing, this study contributes to the broader literature on disaster risk management and financial policies, ultimately aiding in the mitigation of financial risks associated with natural disasters.

2 Data and Summary Statistics

2.1 Data Description

We collect data on storm events in the U.S. and their associated property damage estimates from the National Climate Data Center of the U.S. National Oceanic & Atmospheric Administration from 1989 to 2017. We aggregate the property damage at the year-state-county level and exclude storm events with less than $1 million in property damage at the county level.

Following the literature that examines the effect of real estate shocks (Cvijanović, 2014; Chaney et al., 2012) and climate-related financial risk (Huynh et al., 2020; Javadi and Masum, 2021) on firms' policies and performance, we determine a firm's exposure to storm events using the location of its headquarter. While there are concerns about using firms' headquarters location as a proxy for exposure to hurricane risk, Pirinsky and Wang (2006); Chaney et al. (2012) argue that a firm has substantial real estate ownership and conducts its core business activities in the state where it is headquartered. We conjecture that a firm headquartered in a county affected by severe storm events is subject to higher climate-related financial risk and might thus be considered riskier by investors.

We obtain firms' headquarters addresses from Compustat and use the 2021 Q4 zip-county mapping data from the U.S. Housing and Urban Development to assign each firm to a county based on its headquarters address. Our sample is restricted to non-financial U.S.-based firms headquartered in a county that experienced at least one storm event with damages exceeding $1 million during our sample period. Firms' financial information comes from Compustat Quarterly files.

We collect data on private loans issued by U.S. firms and denominated in U.S. dollars from the LPC/Dealscan database. The loan data are matched to the Compustat dataset using the file from Chava and Roberts (2008), updated on April 13, 2018, and contain

information on *facilities*, which are individual loans, and on *packages*, which are groups of facilities issued under the same loan agreement. A loan is considered affected by a storm event if it is issued in the three years following the year of a storm event in the county where the issuer is headquartered. Loans issued the same year as a storm event are not considered affected by that storm event. The binary variable *Post Storm Event* tracks the affected loans. To ensure that firms' financials precede the deal's active date by at least three months, we collect firms' financials from the beginning of the quarter preceding the quarter in which the loan was issued.

We compute the term and credit spreads using data from the Federal Reserve Bank of St. Louis and match them to firms' financials. We exclude all observations for which any of the main regression variables are missing and winsorize firm characteristics at the 1% and 99% levels to alleviate the effect of outliers. The final sample consists of 27,815 facilities from 19,362 packages or deals issued by 5,448 firms between 1982 and 2017. All variables used in our regression analyses are further detailed in the Appendix.

2.2 Summary Statistics

Table 1 reports summary statistics for the main variables used in our regression analyses. In our sample, 55% of deals are affected deals (*Post Storm Event*), meaning that the deals were issued within three years following a storm event. The average borrower has a log value of assets (*Firm size*) of 6.72, market-to-book ratio of 1.42, leverage of 0.31, and a ratio of operating income before depreciation to total assets (*Profitability*) of 3%. The average ratio of net property, plant, and equipment to total assets (*PPE*) is 35%. Tangible assets are a substantial proportion of a firm's value; thus, their destruction by a severe hurricane can have a great negative impact on the firm. In our final sample, 47% of firms have an S&P long-term credit rating (*Rated*), and 25% have a rating of BBB- or better (*Investment Grade*), The average deal has 2.17 covenants (*Covenants Intensity*), a commitment (*Offering*

Amount) of $529.23 million, and a maturity of about 50 months. The average facility has a spread of 221.42 bps over LIBOR. Collateral (*Secured*) is required on 54% of facilities, and 73% of deals have more than one lender (*Syndicated*), with an average of 10.22 lenders per deal.

Table 1 also presents a univariate comparison of affected loans (*Post S.E. = 1*) and non-affected loans (*Post S.E. = 0*). Firms that issued loans following a storm event, on average, are larger, have more tangible assets, and are more likely to have a credit rating and an investment grade rating. Loans that are issued following a storm event, on average, have more covenants, are larger in size but shorter in maturity, are more likely to be syndicated with a larger number of lenders, and are more likely to require collateral. These results show that there is significant heterogeneity between loans that are affected by a storm event and those that are not.

3 Empirical Analysis

3.1 Empirical Specifications

To examine the effects of a hurricane shock on loan terms, we run several regressions of the form

$$Y_i = f(\beta_0 + \beta_1 \cdot \text{Post Storm Event} + \boldsymbol{\beta}^\top X),$$

where β_1 is the coefficient of interest and captures the effect of the hurricane on loan contract terms after controlling for covariates X. Most of the dependent variables in our analysis, such as *Syndicated* and *Secured* are binary dummy variables with $Y_i = 1$ when the loan issue i includes the particular loan term characteristic of interest and $Y_i = 0$ otherwise. We estimate the probability of the loan having these characteristics with a probit model of

the form

$$\Pr(Y_i = 1) = \Phi(\beta_0 + \beta_1 \cdot \text{Post Storm Event} + \boldsymbol{\beta}^\top X), \tag{1}$$

where $\Phi(\cdot)$ is the standard normal cumulative distribution function. For continuous dependent variables such as *Loan size*, *Maturity* and *Spread*, we analyze the change in these loan terms using a linear model with the specification

$$Y_i = \beta_0 + \beta_1 \cdot \text{Post Storm Event} + \boldsymbol{\beta}^\top X + \alpha_i, \tag{2}$$

where α_i is the firm fixed effect. Finally, for count variables such as the number of *Covenants* we use the following Poisson regression

$$\begin{aligned} Pr(Y = y_i) &= \frac{e^{-\lambda}\lambda^y}{y!}, \quad y_i = 0, 1, 2, ... \\ E(y_i) &= \lambda = e^{\beta_0 + \beta_1 \cdot \text{Post Storm Event} + \boldsymbol{\beta}^\top X}, \end{aligned} \tag{3}$$

where λ is the intensity or rate parameter. In all the regressions, we control for firms, loan characteristics, and macroeconomic factors, as shown in Table 1. We use robust standard errors adjusted for clustering at the firm level.

3.2 Hurricane Risk and Loan Terms

Panel A of Table 2 shows the result of the regression models for the main contract features that we examine. We do not report the coefficient estimates of the covariates to preserve space. We find that hurricanes and major storm events have statistically and economically significant effects on debt contract features. Loans issued after a storm event have more covenants, larger size, larger spread, are more likely to be syndicated, and are more likely to require collateral; however, they have shorter maturities. To facilitate the interpretation of

results, we report the average marginal effects of *Post Storm Event* on these loan features in Panel B.

Column (1) of Panel B reveals that loans issued within three years of a storm event have 0.63 more covenants, which, given an average of 2.17 covenants per deal, corresponds to 29% more covenants. Columns (2), (3), and (4) show that the average deal affected by a storm event is 10% larger in size, 3.33% shorter in maturity, and has a 2.33 percentage point (pp) more likelihood of being syndicated. Given the average firm size of $5,239 million and loan size of $529 million, the increase in deal commitment of 10% corresponds to 1% of firm assets before the deal. At the facility level, columns (5) and (6) show that an individual loan within the deal has a 5 pp, which translates to 9% more likelihood of being secured and has a higher spread by 3.87% or 8.57 bps. This increase in the cost of borrowing is also economically important. With the average loan size of $529.23 million, this corresponds to an increase of $453,495 in the cost of borrowing.

The results in Table 2 provide substantial evidence of the impact of hurricanes on firms' financial policies and are consistent with the findings of Javadi and Masum (2021). While firms are able to borrow more following a major storm event, these loans have more covenants, shorter maturities, higher spreads, and are more likely to require collateral. These findings suggest that hurricane-related risk further exacerbates financing frictions.

3.3 Hurricane Impact on Loan Terms: Borrower Characteristics

We augment our baseline analysis from Table 2 by interacting the variable *Post Storm Event* with various borrower characteristics. The goal is to isolate the effect of hurricane-related risk by borrower-specific factors. To facilitate the interpretation of our result, we report the AME in Table 3. In Panel A of Table 3, we interact *Post Storm Event* with *Firm size* and report the AME of a storm event on the main loan features at the 10^{th}, 50^{th}, and 90^{th} percentiles of *Firm Size* and the p-value of the difference between the effects at the 10^{th}

and 90^{th} percentiles.

For example, at the 10th percentile, storms have a significant positive effect on the number of covenants included in the post-storm loan issue, indicating tighter loan restrictions for small firms (1.6657^{***}). Furthermore, storm events also have a positive and significant effect on the loan size of small firms (0.2589^{***}), indicating that they demand more funds after a storm event.However, as we move toward the 50th and 90th percentiles of firm size, the effects of storms on the number of covenants and loan size become less pronounced, suggesting a diminishing impact of storm events for larger firms, and the statistical significance disappears at the 90th percentile. The small p-values of the difference between the 10th and 90th percentiles for covenant inclusion and loan size in the fourth row indicate that this firm characteristic is a key determinant of these loan terms.

Two other interesting results are the positive impact on Syndicated and Secured for firms across all three percentiles of firm size. These results indicate that after a storm event, there is an increase in the risk-sharing appetite among multiple lenders, which is accompanied by greater demand for Secured from borrowing firms, regardless of their size. We also find that the effects of storm events on loan maturity are (mostly) statistically insignificant, with the exception of median-sized firms, which experience a shortening of repayment duration (-0.0334^{*}). Additionally, storm events have statistically significant effects on loan spreads for firms at the 50th and 90th percentiles of firm size (0.0356^{**} and 0.0587^{*}, respectively), but no significant effects for firms at the 10th percentile.

The second characteristic we consider is the market-to-book ratio. In contrast to our findings for the firm size analysis, storms have a highly significant positive effect on the number of covenants, loan size, Syndicated, and Secured for firms at all percentiles, regardless of the level of the market-to-book ratio. Note that the magnitude of the effect decreases as we move from the 10th to the 90th percentile for covenants, while it increases for loan size, Syndicated, and Secured. Firms with high market-to-book ratios are, on average, less capital intensive, have greater growth opportunities, and are more dependent on intangible capital.

Thus, storm events are expected to cause less physical damage to firms that rely heavily on tangible capital, such as firms with low market-to-book ratios.

Similar to the previous analysis, Syndicated and Secured are highly significant at all percentiles of the market-to-book ratio while only the loan maturity of median-sized firms is marginally reduced (-0.0338*). Additionally, storms have a positive and significant effect on the loan spread for firms at both the 50th (0.0372**) and 90th (0.0452*) percentiles of the market-to-book ratio. The result suggests that firms at the bottom of low end of the market-to-book ratio distribution do not experience a statistically significant increase in their borrowing costs, likely due to their larger stock of capital on average than firms at the middle or top percentiles.

Thirdly, when examining leverage, storms have a positive and significant effect on the number of covenants, loan size, and Secured across all leverage percentiles, with an increasing pattern. This indicates that regardless of a firm's leverage level, storms lead to more borrowing with tighter loan restrictions. The more leveraged the firm, the larger the amount borrowed and the tighter the loan restrictions. Interestingly, our results suggest that firms are able to secure larger loans after a storm event regardless of their leverage. Curiously, we find that the Secured of firms with low leverage is the one that experiences the largest increase in Secured demand from lenders in the aftermath of a storm. In terms of loan maturity, we find that firms with the highest leverage ratios experience a statistically significant reduction in loan maturity, with an average marginal effect of -0.0601**. The most striking contrast with the previous analyses of firm size and market-to-book ratios is with respect to loan Syndicated. As shown, Syndicated not only declines with leverage but becomes statistically insignificant for firms at the 90th percentile, suggesting that when highly leveraged firms raise funds after a storm event, they tend to do so from the same known sources. Storm events also have a significant impact on firms with low and median leverage, while firms at the 90th percentile do not experience any statistically significant increase in borrowing costs.

The fourth loan characteristic we examine is asset tangibility. As the analysis shows,

the effects of asset tangibility on covenant inclusion, loan size, and Syndicated are similar to the effects of the market-to-book ratio, including the magnitude of the AMEs. An interesting finding is that, while loan Secured increases after a storm event regardless of the asset tangibility, loan Secured increases the most for firms at the bottom decile, suggesting that physical assets are an important component in preventing tighter loan terms after a storm event. The results on spreads are also consistent with the market-to-book analysis. While there is no significant relationship between asset tangibility and credit spread at the 90th percentile, the effects are positively significant at the lower percentiles, with the most pronounced effect observed at P10 ($0.0421^{\star}$).

Lastly, we analyze how the borrower's credit rating may impact loan agreements after a storm event. As the analysis reveals, all firms, regardless of their credit rating, have a greater number of covenants in their loans, suggesting that all firms face more stringent monitoring and restrictions on their financial activities. Note, however, that unrated firms have a significantly higher number of covenants after a storm event than investment-grade firms, with a statistically different difference as indicated by the p-value in the last row. Additionally, we find that unrated firms are the only group that has a statistically significant increase in loan size, and these differences between unrated ($0.1764^{\star\star}$) and investment-grade (0.0195) firms are statistically and economically significant. These results suggest that lenders meet the increased demand for loans to firms with no credit ratings after a storm event. For unrated and investment-grade firms, maturity and Syndicated show significant changes, while Secured is significant for unrated ($0.0670^{\star\star}$) and speculative-grade ($0.0453^{\star\star}$) borrowers. The spread is only significant for unrated firms, with an increase in the AME of $0.0572^{\star\star}$. In short, unrated credit-rated firms face an increase in the number of covenants, increased Secured requirements, and higher borrowing costs reflected in the loan spread, but are able to secure larger loans. Except for loan size, speculative-grade firms experience similar effects but to a lesser extent. In contrast, investment-grade firms generally maintain their existing loan terms with minimal changes in loan size, Secured, and spread.

Overall, we find that the increase in the number of covenants after a storm event is a universal finding, regardless of the firm characteristics. Small unrated firms significantly increase their demand for funds after the storm event, but face stricter lending conditions. Surprisingly, firms with low asset tangibility (or high book-to-market) have lower Secured requirements than firms with less tangible assets, suggesting that the destruction of capital by storm events is particularly risky for those firms without much pledgeable physical capital.

3.4 Hurricane Impact on Loan Terms based on Lender Types

Table 4 presents comprehensive findings regarding the AME of a storm event on loan terms based on lender types. More specifically, we categorized lenders by lead bank type, lender share, and relationship dynamics.

The first part of the table contain the results for three groups of lead bank type: commercial banks, securities firms, and other lenders. Regarding covenants, all three types of banks show significant positive effects ($0.6163^{***}, 0.8528^{***}$, and 0.6150^{***}, respectively), indicating that the storm event influences the inclusion of covenants in loan agreements regardless of the lender's type. In terms of loan size, both commercial banks and other lenders exhibit significant effects (0.0777^{***} and 0.3548^{***}, respectively), indicating that these financial institutions increase the supply of funds available to firms after a storm event. Concerning loan maturity, only other lenders show a significant reduction (-0.2577^{***}), indicating a higher likelihood of shorter loan maturities in response to a storm event. When it comes to loan syndication, only commercial banks demonstrate a significant increase (0.0232^{***}), indicating that commercial banks have a higher propensity to involve other banks in syndicating loans after a storm event.

All three types of banks show a positive and significant impact on the amount of secured loans (0.0368^{***}, 0.0847^{***}, and 0.1438^{***}, respectively), with securities firms and other lenders exhibiting the largest effects, suggesting that securities firms and other lenders re-

quire higher levels of secured loans compared to commercial banks. The last column of Table 4 shows that commercial banks significantly increase the loan spread (0.0428**), while other lenders decrease it (-0.0915*), indicating that commercial banks charge, on average, higher spreads on loans after a storm event, while other lenders offer loans at lower spreads.

These results reveal that different types of lenders take a significantly different approaches when it comes to hedging the risks associated with post-storm loans. We find that all three types of banks use covenants and secured loans to mitigate some of this risk. However, while commercial banks further diversify the risk through syndication and by charging a higher spread, other lenders significantly shorten the maturity of loans.

The middle part of Table 4 contain the results by lender share and it reveals consistent patterns across different loan characteristics shown in the columns. Lender share exhibits a monotonically increasing effect on covenants, loan size, secured loans, and spread, while displaying a decreasing effect on loan maturity. A higher lender share is associated with a greater likelihood of including covenants in loan agreements, with coefficients strengthening across percentiles: 0.4953*** at P10, 0.9414*** at P50, and 1.5987*** at P90. Larger lender shares also positively influence loan size, with coefficients of 0.0647** at P50 and 0.2385*** at P90, indicating a significant impact in the upper percentiles. Conversely, an increase in lender share decreases the loan maturity, as coefficients ranging from -0.0378* at P10 to -0.1553* at P90, signaling shorter maturities in the upper percentiles. Additionally, higher lender shares increase the likelihood of securing the loan, with coefficients of 0.0599*** at P50 and 0.1295*** at P90, indicating a substantial effect. Curiously, low (P10) and high (P90) lender shares do not seem to result in higher spreads as the only statistically significant coefficients are those in P50, with a coefficient of 0.0720**.

The last set of results in Table 4 contains the interaction between *Post S.E.* and *Relationship* variables. The objective of this analysis is to shed light on how the impact of the storm event on loan terms varies depending on the pre-existing borrower-lender relationship. We aggregate the lenders to their parent company. A borrower has a previous lending relation-

ship with the lead bank if within the five preceding the deal the borrower had at least one loan issue with the same lead bank. The highly significant regression coefficients regarding covenants, loan size, and secured loans resulting from the interaction between *Post S.E.* and *Relationship* suggests that borrowers with a transactional relationship with their financial institution (i.e., without an established relationship) experienced significantly tighter loan market conditions after a storm event relative to those with an established relationship. Our analysis shows a greater increase in the inclusion of covenants (0.8046^{***} vs. 0.4644^{***}), larger loan sizes (0.1522^{***} vs. 0.0346), and more stringent secured loan requirements (0.0598^{***} vs. 0.0363^{***}).

When dealing with borrowers they had no prior relationship with, lenders displayed increased caution and implemented additional risk management measures in response to the storm. This could be attributed to the lack of established trust and familiarity with the borrower's creditworthiness. Consequently, these lenders may have sought to mitigate potential risks by demanding a larger number of covenants, heightening securitization requirements, shortening loan maturity (-0.0691^{***} vs -0.0098), and increasing spreads (0.0476^{**} vs. 0.0334). On the other hand, lenders who were already familiar with borrowers they had an existing relationship with may have relied more on the established trust and the borrower's demonstrated creditworthiness. Consequently, these lenders might have perceived a relatively lower need for extensive securitization or additional risk management measures following the storm event. The existing relationship likely provided a level of comfort and confidence, leading to a more lenient approach in terms of post-storm adjustments to loan terms. These findings underscore the importance of pre-existing relationships between borrowers and lenders in determining the impact of a storm event on lending market conditions.

3.5 Hurricane Impact on Loan Terms based on Macroeconomic Factors

In this section, we interact the *Post S.E.* variable with several macroeconomic indicators that are known to be key determinants of lending market conditions. Table 5 shows the results of our regression analysis when we control for the Fed funds rate, term spread, credit spread, net private savings, GDP growth, and the CPI.

We start analyzing the impact of monetary policy, proxied by the Fed funds rate, on loan terms after a storm event realizes. As shown, the monetary regime has critical impact on the number of covenants included on loan contracts after a storm event. During periods of large money supply and low interest rates, the availability of credit and banking competition prevent lenders from including covenants as loan terms as indicated by the negative regression coefficient of -0.3086$\star\star\star$, since the bargaining power is with borrowers. In contrast, during tight monetary policy regimes where the availability of credit is considerably limited, the bargain power shifts back to lenders who take several measures to protect their loans. Our results show that lenders increase the number of covenants (0.5874***), significantly reduce maturity (-0.0978***), and increase syndication (0.0235). Note that the difference test for covenants and maturity is statistically significant at the 1% level, highlighting the distinct effects caused by the two different monetary policy regimes on loan terms after a storm event. Interestingly, loan size is apparently unaffected by the monetary policy regime, which indicates that firms to not take opportunity of the storm event to borrow more.

The effects of credit and term spreads are similar, both in direction and magnitude, when it comes to their effect on covenants, loan size, and securitization. The key difference is on loan syndication. During periods of high credit spreads, we observe a significant effect on loan syndication (0.0226*** that disappear during periods of high term spread. The difference test for the term spread has a p-value of 0.0117.

Next, we investigate the the effects of net private saving on loan terms. This is a measure

of the supply of private credit available to firms in the economy. We show that regardless of low (P10) or high (P90) net private savings, the number of covenants, loan size, syndication, and securitization, always increase after a storm event. Curiously, we document that, during periods of high net private savings, the maturity is significantly reduced (-0.0433* $\star\star$).

The last two macroeconomic factors we investigate are the real GDP growth and inflation, measured by the CPI index. As before, the loan terms that are affected the most are the number of covenants, loan size, syndication, and securitization. All experience a positive AME after a storm event, regardless of which part of the business cycle the economy is in. Interestingly, spreads tend to be higher during economic expansions (0.0520** than during periods of low economic growth (0.0377*).

3.6 Hurricane Impact on Loan Terms: Other Loan Features

Table 6 presents the effects of storm events on various other characteristics of loan terms, such as performance pricing, credit line, upfront fee, number of lenders, and number of required lenders.

The table is divided into different sections that provide insights into the effects based on different categorizations and factors. The first section of the table examines the impact of a post-storm event on other loan features overall. The results indicate that a storm event has a significant positive effect on performance pricing (0.0718), suggesting that lenders adjust the pricing of loans in response to the event. However, the effects on other loan features such as credit line, upfront fee, number of lenders, and required lenders are not statistically significant.

The subsequent sections of the table explore the impact of a storm event on loan features based on lead bank type and relationship lending. Regarding lead bank type, the results show that commercial banks have a significant positive effect on performance pricing (0.0744), indicating that commercial banks adjust loan pricing upward after a storm event. Security

firms, on the other hand, do not show significant effects on most loan characteristics. Other lenders exhibit significant effects on performance pricing (0.0794) and credit line (0.1152), indicating adjustments in loan terms and availability of funds. The comparison of effects between commercial banks and security firms shows no statistically significant differences.

In terms of relationship lending, the results reveal that transactional relationships have a significant positive effect on performance pricing (0.0848), indicating significant upward adjustments in loan pricing. Relationship lending, on the other hand, shows a significant but weaker positive effect on performance pricing (0.0583), suggesting similar adjustments but to a lesser extent. The analysis also reveals that following a storm event, the transactional lending approach has a significant positive impact on credit line availability, as indicated by a coefficient of 0.0152. This finding suggests that firms engaging in transactional relationships with lenders experience an increase in the availability of credit lines. In contrast, the coefficient associated with relationship lending is not statistically significant, indicating that firms relying on relationship-based lending do not experience a substantial change in credit line availability in response to a storm event. However, the comparison of effects between transactional and relationship lending shows no statistically significant differences.

The last section of the table examines the impact of a storm event on deal purpose. The results indicate that a storm event has a significant positive effect on corporate purposes (0.0145) and acquisition (0.0127), indicating an increase in loan activity for these purposes. However, it has a significant negative effect on debt repayment (-0.0156), suggesting a decrease in loans used for debt repayment. The effects on working capital and other purposes are not statistically significant.

Further analysis based on lead bank type for different loan purposes reveals distinct effects among commercial banks, security firms, and other lenders. Notably, when firms seek loans for acquisitions, relying on security firms as lead lenders leads to a significant increase in credit availability (0.0631). This implies that security firms are more willing to provide credit for acquisition activities following a storm event. However, when firms require working

capital financing, relying on security firms as lead lenders results in a significant decline in credit availability (0.0482). On the other hand, other lenders show varying effects depending on the loan purpose. For corporate expenses, such as investments or expansions, other lenders have a significant positive effect (coefficient: 0.0803), indicating a notable increase in credit availability. In contrast, for debt repayments, other lenders have a significant negative effect (coefficient: 0.0737), implying a considerable decrease in credit availability. Importantly, the differences between commercial banks and security firms were not statistically significant across all deal purpose categories. This implies that the impact on credit availability for different purposes is similar regardless of the lead lender's type. Hence, the choice of lead bank type may not significantly affect the availability of credit for various loan purposes in response to a storm event.

The analysis based on relationship dynamics shows that following a storm event, firms relying on relationship-based lending experience an increase in credit availability for corporate purposes (0.0201) and acquisitions (0.0168). This indicates that relationship lenders are more willing to provide credit for investments, expansions, and acquisitions in the aftermath of a storm event. However, firms seeking credit for debt repayments encounter a decrease in credit availability (-0.0283), implying that relationship lenders are less inclined to extend credit for debt repayment purposes during this period.However, there is no statistically significant difference between the coefficients of relationship-based lenders and transactional lenders. This suggests that, in statistical terms, both types of lenders have a similar impact on credit availability for different loan purposes following a storm event.

In summary, the table provides insights into the effects of a storm event on various additional loan characteristics. It shows that different types of lenders and relationship dynamics respond differently to the event. Commercial banks tend to adjust loan pricing, while other lenders adjust loan terms and increase credit line availability. Transactional relationships show stronger increases in loan performance pricing compared to relationship lending. Additionally, the storm event affects loan purposes, with significant increases observed for cor-

porate purposes, acquisitions, and significant decreases observed for debt repayment. These findings highlight the importance of considering lender characteristics and relationship dynamics when examining the impact of a storm event on loan terms and purposes.

Table 8 provides valuable insights into the effects of storm events on market segment selection. The table includes results for the overall sample and subgroups based on lead bank type and relationship lending. These findings are crucial for understanding the dynamics of financial markets and their responses to external shocks, benefiting market participants, policymakers, and researchers alike. Investors' decision-making processes in selecting market segments are influenced by various factors, including risk appetite, potential returns, and perceived opportunities arising from storm events. The coefficients presented in the table shed light on the magnitude and significance of these effects.

The results in the top panel demonstrate that a post-storm event has a statistically significant positive impact on the selection of institutional (0.0117), leveraged (0.0788), highly leveraged (0.0546), and non-investment-grade (0.0960) segments. These findings indicate that investors are more inclined to choose these segments following a storm event. However, the storm event does not appear to have a significant effect on the covenant lite segment. These findings provide valuable insights into the market segment preferences of investors in response to storm events. By understanding these effects, market participants can better navigate market dynamics, policymakers can develop appropriate measures to manage potential risks, and researchers can advance their understanding of financial markets' behavior during periods of external shocks.

The second panel of the table displays the average marginal effects (A.M.E) of storm events on market segment selection categorized by lead bank type. For commercial banks, the coefficients indicate positive effects on leveraged (0.0794), highly leveraged (0.0552), and non-investment-grade (0.0935) market segments. However, the storm event shows no significant effect on institutional (0.0075) and covenant lite segments (0.0008). In the case of security firms, the A.M.E. suggest statistically significant positive effects on institutional (0.0429),

leveraged (0.0710), highly leveraged (0.0862), and non-investment-grade (0.0997) segments. The positive coefficients indicate an increased preference for these segments following a storm event. On the other hand, other lenders exhibit mixed results. The coefficients show a significantly positive effect on non-investment grade (0.0608) and significantly negative effect on highly leveraged (0.0667) segments. However, none of these comparisons between banks and security firms reach statistical significance.

The third panel of the table provides insights into the effects of storm events on market segment selection based on the type of relationship lending. For transactions categorized as transactional relationships, the coefficients indicate statistically significant positive effects on institutional (0.0124), leveraged (0.0994), highly leveraged (0.0767), and non-investment-grade (0.1120) segments. These findings suggest that storm events increase investors' inclination towards these segments in transactional relationships. Furthermore, there is a statistically significant albeit a small positive effect on covenant lite segments (0.0066). This indicates that investors are slightly more likely to select covenant lite segments following a storm event in transactional relationships. On the other hand, for relationship lending, positive effects are observed on leveraged (0.0564), highly leveraged (0.0288), and non-investment-grade (0.0766) segments. The observed differences in market segment selection between relationship and transaction lenders following storm events do not attain statistical significance.

In the fourth panel of the table, the results highlight the effects of a post-storm event on market segment selection. The findings reveal statistically significant positive effects on the US middle market segment (0.0532), the US traditional middle market segment (0.0315), and the US large middle market segment (0.0194). These results indicate that after a storm event, investors show an increased inclination towards these middle market segments. However, there is no significant effect observed on the m_a segment. Notably, the analysis identifies a statistically significant negative effect on the project finance segment (-0.0041), suggesting a decrease in investors' preference for this particular segment following a storm event.

In the analysis of lead bank types in the fifth panel, the results demonstrate notable patterns. Among commercial banks, a post-storm event exhibits a statistically significant negative effect on the selection of the m_a market segment (-0.0120), implying a decrease in the preference for this segment following a storm event. However, in contrast, the analysis reveals statistically significant positive effects on the selection of other market segments for both commercial banks and security firms. Specifically, both commercial banks and security firms show an increased inclination towards the US middle market segment (0.0517 and 0.1006), the US traditional middle market segment (0.0320 and 0.0495), and the US large middle market segment (0.0163 and 0.0530) after a storm event. These findings highlight the active responsiveness of commercial banks and security firms to external shocks, such as storm events, as they redirect their focus towards these specific market segments, potentially driven by factors such as risk assessment, return potential, or perceived opportunities arising from the storm event.

In the analysis of relationship lending in the sixth panel, there is a statistically significant decrease in the inclination towards the m_a segment (-0.0113) and project_finance market segments (-0.0067). On the other hand, a post-storm event has a statistically significant positive effect on the selection of the us middle market segment (0.0804), the us traditional middle market segment (0.0465), and the us large middle market segment (0.0324). These findings suggest that in transactional relationships, storm events influence investors' preferences by decreasing their inclination towards m_a and project_finance market segments while increasing their preference for us middle markets. In contrast, for transactions categorized as relationship lending, the effects of a post-storm event on market segment selection are relatively less pronounced. While there is a statistically significant positive effect on the selection of the us middle (0.0295) and us traditional middle (0.0198) market segments, the effects on other segments are not statistically significant. Furthermore, the coefficients for relationship lending are generally smaller compared to those for transactional relationships. This indicates that the impact of storm events on market segment selection is relatively

weaker in the context of relationship lending. The p-values comparing the effects between banks and security firms show that none of the comparisons reach statistical significance. This suggests that there are no statistically significant differences in the effects of storm events on market segment selection between relationship and transaction lenders.

Overall, the results highlight the differential responses of lead bank types and relationship lending to storm events in market segment preferences. Commercial banks demonstrate a decrease in inclination towards market segments, while security firms show an increased preference. The findings underscore the importance of considering bank type and relationship lending in understanding the effects of external shocks on market dynamics.

3.7 Hurricane Risk and Likelihood of Renegotiation

Table 9 presents the effects of storm on loan amendment and renegotiation outcomes in relation to hurricane risk. The effects of a post-storm event on various variables are examined, considering different factors such as deal amendment, deal amount amendment, lead bank type, and relationship lending. In the first part of the table, the *Deal Amended* and *Deal Amount Amended* sections show the effects of a post-storm event on the likelihood of deal amendment and changes in the loan amount. As before, the reported coefficients indicate the average marginal effects (AME) of the storm event on these variables.

Firstly, a post-storm event is associated with a statistically significant increase in the likelihood of a deal being amended, as indicated by the positive coefficient of 0.0467. This suggests that hurricanes trigger a higher probability of renegotiation, potentially due to the need for adjustments in response to the storm's impact. Secondly, the coefficient of 0.1020, also statistically significant, represents the number of amendments made to the deal following a storm event. This finding implies that hurricanes not only increase the likelihood of renegotiation but also lead to a greater number of changes in the deal terms and conditions. Moving on to the outcomes of renegotiation, the coefficient of 0.0319 reveals a statistically

significant positive effect of post-storm events on the changes in loan amount during the renegotiation process. This suggests that hurricanes influence the renegotiation decisions and lead to alterations in the loan amounts involved, potentially reflecting the reassessment of risk or funding needs in the aftermath of the storm. Additionally, the coefficient of 0.0366 signifies a statistically significant increase in the loan amount for deals that have been amended following a storm event. This finding suggests that hurricanes may result in larger loan amounts for renegotiated deals, potentially driven by the need for additional financing to address storm-related damages or to support recovery efforts. Lastly, there is no statistically significant effect of post-storm events on the number of months between amendments, as indicated by the insignificant coefficient of -1.0023.

Next, the table explores the effects of the storm event on likelihood and outcomes of renegotiation based on different lead bank types. The *Commercial Banks Security Firms* and *Other Lenders* sections provide insights into the differences in effects across these categories. Among commercial banks, a post-storm event has a statistically significant positive effect on the likelihood of deal amendment (0.0489). It also has statistically significant positive effects on the number of amendments (0.1111) and the change in loan amount (0.0406). These findings suggest that commercial banks are more likely to engage in renegotiation activities and make increases to loan amounts (0.0491) following a storm event. Among the different types of lenders, security firms exhibit relatively smaller and non-significant effects in relation to storm events and renegotiation outcomes, with one exception. The coefficient of 0.0364 for *Deal Amended* suggests a positive and marginally significant relationship between storm events and the likelihood of amendments specifically for security firms. This indicates that, compared to commercial banks, security firms may be less influenced by storm events when it comes to making amendments during the renegotiation process. Finally, the coefficients for other lenders in the table are generally small and not statistically significant, suggesting that storm events have no impact on the likelihood of amendments and other renegotiation outcomes for this group.

Third, we examine the impact of storm events on renegotiation outcomes, focusing on relationship dynamics. For transactional lenders, the coefficients reveal that storm events have a significant effect on certain renegotiation outcomes. The coefficient for *Deal Amended* is 0.0506, indicating a positive and significant association. This suggests that storm events increase the likelihood of transactional lenders amending deals. Similarly, the coefficient for *Number of Amendments* is 0.0933, indicating a significant positive relationship. This implies that transactional lenders are more likely to initiate multiple amendments following storm events. However, storm events do not seem to have a significant impact on changes in loan maturity (*Loan Maturity Changed*) or loan amount (*Loan Amount Changed Loan Amount Increased* and *Loan Amount Decreased*) for transactional lenders, as their coefficients are not statistically significant. For relationship lenders, storm events also have significant effects on renegotiation outcomes. The coefficient for *Deal Amended* is 0.0420, indicating a positive and significant association. This suggests that storm events increase the likelihood of relationship lenders amending deals. Similarly, the coefficient for *Number of Amendments* is 0.1051, indicating a significant positive relationship. This implies that relationship lenders are more likely to initiate multiple amendments following storm events. Unlike transactional lenders, storm events do have a significant association with changes and increases in loan amount, as indicated by the coefficients for *Loan Amount Changed* (0.0673) and *Loan Amount Increased* (0.0605). The coefficient for *Loan Amount Decreased* (0.0083) is not statistically significant, suggesting that storm events do not significantly affect decreases in loan amount for relationship lenders. Comparing the effects of storm events on renegotiation outcomes between relationship and transactional lenders, the p-values for the coefficients are not statistically significant. This indicates that there is no statistically significant differences in the effects of storm events on renegotiation outcomes between the two types of lenders.

Fourth, the table presents the results of the analysis for the impact of storm events on two aspects of loan renegotiation outcomes: deal maturity and deal spread. The analysis is further broken down by lead bank type and relationship lending. For the overall sample,

storm events do not have a significant impact on deal maturity or deal spread as none of the coefficients are statistically significant. Among commercial banks, the coefficient for *Loan Spread Decreased* is -0.0244, indicating that following storm events, the loan spread tends to decrease for commercial banks. For security firms, the coefficients for both *Loan Spread Changed* (-0.1273) and *Loan Spread Increased* (-0.1383,) are negative and statistically significant, implying that storm events have a negative and significant effect on loan spread for security firms.

Lastly, when examining lenders with transactional relationships, the results indicate that storm events do not have statistically significant effects on deal maturity or loan spread. On the other hand, for lenders with relationship-based lending, the coefficient for *Deal Maturity Decreased* is -0.0254, which is statistically significant. This finding suggests that following storm events, there is a negative and significant impact on deal maturity for lenders with relationship-based lending. Furthermore, the difference in the effect of storm events on deal maturity between transactional and relationship lending is statistically significant, indicating that the impact varies depending on the type of lending relationship.

4 Conclusion

This study has examined the specific impact of hurricane-related risks on corporate borrowing decisions and loan terms, providing valuable insights into the financial policies adopted by firms in the face of hurricanes. Our analysis reveals several key findings that contribute to our understanding of how hurricanes influence corporate borrowing and shed light on the role of lenders, policymakers, and companies in managing hurricane risks.

Firstly, hurricanes lead to changes in loan terms, reflecting lenders' response to heightened risk. We observe an increase in the number of covenants in loan contracts, larger loan sizes, shorter loan maturity, increased syndication, and a higher demand for secured credit. These findings indicate that lenders are implementing risk mitigation measures and adjusting their

lending practices to accommodate the challenges posed by hurricanes.

Secondly, borrower characteristics play a significant role in shaping the impact of storms on loan terms. Small firms experience tighter loan restrictions and demand larger loans after a storm event, while the impact diminishes for larger firms. The market-to-book ratio and leverage levels also influence loan terms, with low market-to-book ratio firms and highly leveraged firms being more affected by storms. Furthermore, the tangibility of assets plays a role in preventing tighter loan terms after a storm event.

Thirdly, different types of lenders exhibit diverse risk mitigation strategies. Commercial banks, securities firms, and other lenders all increase the inclusion of covenants in loan agreements after a storm event. Commercial banks and other lenders increase the supply of funds available to firms, while other lenders show a reduction in loan maturity. There are also differences in the requirements for secured loans and loan spreads between commercial banks and securities firms or other lenders.

Fourthly, pre-existing borrower-lender relationships influence the response of lenders to storm events. Borrowers without a relationship experience a greater increase in covenants, loan size, and secured requirements compared to those with an established relationship. The relationship status also affects loan maturity and syndication outcomes.

Finally, hurricanes significantly increase the likelihood of deal amendment and lead to substantial adjustments in loan amounts. This highlights the need for renegotiation and adjustments in response to the storm's impact. Commercial banks are more responsive to storm risks and play a crucial role in supporting firms affected by hurricanes.

Overall, this study provides empirical evidence on the financial policies adopted by firms in the face of hurricane-related risks. The findings have implications for lenders, policymakers, and companies themselves. Lenders can use these insights to manage and assess risks associated with lending to firms exposed to hurricane-prone regions. Policymakers can develop effective disaster response and recovery strategies by understanding the financial implications of hurricanes. Companies can enhance their disaster preparedness and risk

management strategies by understanding how hurricanes impact their financing options and terms. By filling the gap in the literature and contributing to the understanding of financial policies in the face of hurricane risks, this study provides valuable insights for financial stability, informed decision-making, and the resilience of businesses in hurricane-prone regions. The findings can aid in the development of policies and initiatives aimed at enhancing financial stability and resilience, ultimately mitigating the financial risks associated with natural disasters.

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Appendix: Variable Definitions

- *Post Storm Event*: Dummy variable that equals 1 if the loan was issued in the three years following the year of a storm event in the issuer's county.
- *Firm Size*: Natural logarithm of total assets.
- *Market-to-Book*: Ratio of the sum of the market value of equity and the book value of interest-bearing debt to the sum of book values of equity and interest-bearing debt.
- *Leverage*: Sum of debt in current liabilities and long-term debt divided by assets.
- *PPE*: Ratio of net property, plant and equipment to total assets.
- *Profitability*: Ratio of operating income before depreciation to total assets.
- *Cashflow Volatility*: Standard deviation of the ratio of EBITDA/Assets and is computed using historical data for up to 10 years as available.
- *Investment Grade*: A dummy variable that equals 1 if the company S&P long-term credit rating is 'BBB-" or better, and equals 0 if the rating is worse than 'BBB-" or the company is unrated.
- *Rated*: A dummy variable that equals 1 if the company has an S&P long-term credit rating, and equals 0 otherwise.
- *Covenants Intensity*: Count variable equals to the number of covenants in the loan package.
- *Loan Size*: Natural logarithm of the loan amount.
- *Maturity*: The number of years between the offering date and the maturity date.
- *Syndicated*: A dummy variable that equals 1 if the deal has more than one lender.
- *Number of Lenders*: The number of lenders per package.
- *Deal purpose*: Type of purpose the deal was issued for.
- *Secured*: A dummy variable that equals 1 if at least one facility in the deal is secured.
- *Spread*: The amount the borrower pays in basis points over LIBOR for each dollar drawn down.
- *Performance Pricing*: A dummy variable that equals 1 if at least one facility in the package has a performance pricing grid attached to it.
- *Upfront Fee*: The upfront fee the borrower pays for each loan.

- *Required Lenders*: The percentage amount of the deal commitment lenders must be holding in order to approve any modifications to the present deal.
- *Term Spread*: The difference between the yields of the 10-year and 1-year treasury bonds.
- *Credit Spread*: The difference between the yields of BAA- and AAA-rated corporate bonds.

Table 1: Summary Statistics

This table presents summary statistics for our data sample, consisting of 27,815 U.S. dollars denominated loans from 19,363 deals issued by 5,448 non-financial firms headquartered in the U.S. from 1982 to 2017. All variables are defined in the Appendix.

	Mean	SD	N	Post S. E. = 0	Post S. E. = 1	T-DIF
Post Storm Event (%)	55	0.50	19362			
Firm Characteristics						
Assets ($ Millions)	5239.11	12836.66	19362	4778.64	5616.49	4.54
Firm Size	6.72	2.07	19362	6.50	6.90	13.33
Market-to-Book	1.42	0.99	19362	1.42	1.43	0.54
Leverage	0.31	0.21	19362	0.31	0.31	2.33
PPE	0.35	0.25	19362	0.34	0.36	7.39
Profitability	0.03	0.03	19362	0.03	0.03	-1.17
Cashflow Volatility	0.02	0.04	19362	0.02	0.03	4.02
Investment Grade (%)	25	43	19362	24	26	4.28
Rated (%)	47	50	19362	43	50	10.23
Loan Characteristics						
Covenants Intensity	2.17	2.69	19362	1.79	2.48	17.98
Offering Amount ($ Millions)	529.23	1326.83	19362	459.92	586.04	6.70
Loan Size	4.95	1.80	19362	4.68	5.16	18.51
Maturity (Months)	49.99	31.18	19362	50.47	49.61	-1.89
Log(Maturity)	3.68	0.77	19362	3.67	3.69	1.69
Syndicated	0.73	0.44	19362	0.68	0.78	15.24
Number of Lenders	10.22	16.02	19362	9.27	11.01	7.60
Secured (%)	54	50	27815	52	55	4.65
Spread (bps)	221.42	153.05	24269	220.62	222.04	0.72
Log(Spread)	5.13	0.82	24267	5.11	5.14	3.06
Macroeconomic Characteristics						
Term Spread	1.40	1.08	19362	1.44	1.36	-4.95
Credit Spread	0.91	0.32	19362	0.90	0.92	4.55

Table 2: Hurricane Risk and Loan Terms

This table reports the results for the regressions that examine the effects of a hurricane shock on loan terms. we run several regressions of the form

$$Y = f(\beta_0 + \beta_1 \cdot \text{Post Storm Event} + \boldsymbol{\beta}^\top X).$$

For count variables such as the number of *Covenants*, we examine how hurricanes affect the number of covenants included in the loan contract using the Poisson model in eq. (3). For continuous dependent variables such as *Loan size*, *Maturity*, and *Spread*, we analyze the change in these loan terms using the linear model in eq. (2). Finally, for binary dummy variables such as *Syndicated* and *Secured*, we estimate the probability of the loan having those characteristics using the probit model in eq. (1). In all the regressions, we control for firms and loan characteristics, as well as macroeconomic factors, as shown in Table 1. We suppress the coefficient estimates of the covariates to preserve space. Standard errors are adjusted for clustering at the firm level. All variables are defined in the Appendix. t statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Panel A: Regression Results

	(1) Covenants (Poisson)	(2) Loan Size (Linear)	(3) Maturity (Linear)	(4) Syndicated (Probit)	(5) Secured (Probit)	(6) Spread (Linear)
Post Storm Event	0.30***	0.10***	-0.03*	0.12***	0.17***	0.04**
	(14.60)	(4.40)	(-1.77)	(4.40)	(6.42)	(2.19)
All Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firms F.E.	No	Yes	Yes	No	No	Yes
Observations	19362	19362	19362	19362	27815	24267
R^2		0.86	0.49			0.71
Pseudo R^2	0.13			0.42	0.23	

Panel B: Average Marginal Effect (A.M.E.) of Hurricane Risk on Loan Terms

	(1) Change in the Number of Covenants	(2) Proportion of Change in the Loan Size	(3) Proportion of Change in Maturity	(4) Change in the Prob. of being Syndicated	(5) Change in the Prob. of being Secured	(6) Proportion of Change in Spread
Post Storm Event	0.6306***	0.1007***	-0.0333*	0.0234***	0.0509***	0.0387**
	(15.26)	(4.40)	(-1.77)	(4.37)	(6.43)	(2.19)

Table 3: A.M.E. of Storm Event on Loan Terms by Borrower Characteristics

This Table presents the AME of storm event on loan terms by borrower characteristics. We interact Post Storm Event with the firm characteristic (e.g. Firm Size) and run the regressions described in Table 2. Standard errors are adjusted for clustering at the firm level. All variables are defined in the Appendix. t statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	(1) Covenants	(2) Loan Size	(3) Maturity	(4) Syndicated	(5) Secured	(6) Spread
Panel A: by Firm Size						
P10	1.6650***	0.2588***	-0.0334	0.0165**	0.0530***	0.0130
	(15.06)	(6.42)	(-1.02)	(1.97)	(4.42)	(0.45)
P50	0.5598***	0.1208***	-0.0333*	0.0260***	0.0543***	0.0356**
	(13.25)	(5.48)	(-1.81)	(4.17)	(6.29)	(2.10)
P90	0.0504	-0.0255	-0.0333	0.0353***	0.0527***	0.0587*
	(1.05)	(-0.58)	(-0.96)	(2.62)	(3.09)	(1.83)
p-value (P90 - P10)	**0.0000**	**0.0001**	0.9986	0.3164	0.9905	0.3643
Panel B: by Market-to-Book						
P10	0.7388***	0.0965***	-0.0345	0.0183***	0.0490***	0.0344
	(13.22)	(3.43)	(-1.41)	(2.76)	(5.01)	(1.59)
P50	0.6713***	0.0992***	-0.0337*	0.0216***	0.0503***	0.0372**
	(15.01)	(4.23)	(-1.69)	(3.86)	(6.13)	(2.05)
P90	0.4952***	0.1072***	-0.0316	0.0315***	0.0537***	0.0452*
	(9.37)	(2.98)	(-1.22)	(4.18)	(4.69)	(1.71)
p-value (P90 - P10)	**0.0007**	0.8075	0.9322	0.1518	0.7390	0.7370
Panel C: by Leverage						
P10	0.5942***	0.0972***	-0.0057	0.0337***	0.0619***	0.0480*
	(9.50)	(2.75)	(-0.20)	(4.06)	(5.06)	(1.74)
P50	0.6289***	0.1005***	-0.0316*	0.0237***	0.0518***	0.0394**
	(15.33)	(4.41)	(-1.68)	(4.43)	(6.51)	(2.21)
P90	0.6658***	0.1041***	-0.0600**	0.0130	0.0401***	0.0299
	(9.38)	(2.71)	(-2.05)	(1.39)	(3.11)	(1.18)
p-value (P90 - P10)	0.4968	0.9051	0.2176	0.1387	0.2655	0.6478
Panel D: by Asset Tangibility						
P10	0.6591***	0.1003***	-0.0079	0.0176**	0.0538***	0.0421*
	(10.68)	(2.75)	(-0.30)	(2.36)	(4.75)	(1.65)
P50	0.6360***	0.1006***	-0.0283	0.0221***	0.0517***	0.0394**
	(15.24)	(4.17)	(-1.50)	(4.19)	(6.45)	(2.18)
P90	0.5897***	0.1014**	-0.0699*	0.0315***	0.0472***	0.0338
	(7.65)	(2.56)	(-1.88)	(2.83)	(3.07)	(1.07)
p-value (P90 - P10)	0.5319	0.9853	0.2229	0.3595	0.7553	0.8533
Panel E: by Credit Rating						
Unrated	0.8600***	0.1764***	-0.0428*	0.0321***	0.0670***	0.0572**
	(14.80)	(6.22)	(-1.75)	(4.12)	(6.25)	(2.55)
Speculative Grade	0.4408***	0.0544	0.0503	-0.0158	0.0453***	-0.0131
	(4.05)	(1.18)	(1.44)	(-1.47)	(2.77)	(-0.47)
Investment Grade	0.2707***	0.0195	-0.0781**	0.0378***	0.0134	0.0558
	(5.19)	(0.43)	(-2.04)	(4.23)	(0.96)	(1.38)
p-value (IG - Unrated)	**0.0000**	**0.0031**	0.4345	0.6363	**0.0022**	0.9761

Table 4: A.M.E of Storm Event on Loan Terms by Lender Characteristics

This Table presents the AME of storm event on loan terms by lender characteristics. We interact Post Storm Event with the lender characteristic (e.g. Lead Bank Type), and run the regressions described in Table 2. Standard errors are adjusted for clustering at the firm level. All variables are defined in the Appendix. t statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	(1) Covenants	(2) Loan Size	(3) Maturity	(4) Syndicated	(5) Secured	(6) Spread
by Lead Bank Type						
Commercial Banks	0.6162***	0.0776***	-0.0223	0.0232***	0.0368***	0.0428**
	(13.87)	(3.19)	(-1.08)	(4.02)	(4.42)	(2.33)
Security Firms	0.8528***	0.1255	-0.0732	0.0290	0.0847***	0.0423
	(4.50)	(1.38)	(-1.01)	(1.05)	(3.20)	(0.61)
Other Lenders	0.6148***	0.3571***	-0.2572***	0.0349	0.1438***	-0.0915*
	(3.91)	(3.85)	(-4.23)	(1.59)	(4.28)	(-1.67)
p-value (Banks - Sec. Firms)	0.2201	0.6048	0.4944	0.8364	**0.0807**	0.9941
p-value (Banks - Other)	0.9927	**0.0028**	**0.0002**	0.6070	**0.0018**	**0.0190**
by Lead Bank Share of the Deal						
P10	0.4953***	-0.0050	-0.0378	0.0010	0.0318*	0.0646
	(5.36)	(-0.11)	(-0.75)	(1.23)	(1.89)	(1.41)
P50	0.9414***	0.0647*	-0.0714*	0.0194**	0.0599***	0.0720**
	(15.29)	(1.74)	(-1.80)	(2.18)	(4.89)	(2.07)
P90	1.5987***	0.2385***	-0.1553*	0.0123	0.1295***	0.0923
	(15.62)	(2.84)	(-1.85)	(0.56)	(6.70)	(1.49)
p-value (P90 - P10)	**0.0000**	**0.0187**	0.2648	0.6112	**0.0005**	0.7404
by Lead Bank Amount of the Deal						
P10	1.1718***	0.2184***	-0.0877**	0.0272***	0.0922***	0.0939***
	(16.65)	(3.56)	(-2.02)	(3.94)	(7.54)	(2.60)
P50	1.1156***	0.1856***	-0.0832**	0.0315***	0.0844***	0.0853**
	(17.69)	(3.66)	(-2.01)	(4.86)	(7.41)	(2.47)
P90	0.9067***	0.0570	-0.0655	0.0496***	0.0490***	0.0488
	(12.90)	(0.97)	(-1.60)	(4.01)	(3.61)	(1.35)
$p-$value (P90 - P10)	**0.0005**	**0.0530**	0.4410	**0.0834**	**0.0012**	**0.0849**
by Relationship Lending						
Transactional	0.8046***	0.1520***	-0.0692***	0.0183**	0.0598***	0.0476**
	(14.59)	(4.58)	(-2.65)	(2.29)	(5.80)	(2.00)
Relationship	0.4643***	0.0347	-0.0097	0.0269***	0.0363***	0.0334
	(7.96)	(1.34)	(-0.42)	(4.05)	(3.42)	(1.64)
p-value (Rel -Trans)	**0.0000**	**0.0012**	**0.0501**	0.3797	**0.0884**	0.5908

Table 5: A.M.E of Storm Event on Loan Terms by Macroeconomic Factors

This Table presents the AME of storm event on loan terms by macroeconomic factors. We interact Post Storm Event with the macroeconomic factors (e.g. Credit Spread), and run the regressions described in Table 2. Standard errors are adjusted for clustering at the firm level. All variables are defined in the Appendix. t statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	(1) Covenants	(2) Loan Size	(3) Maturity	(4) Syndicated	(5) Secured	(6) Spread
by Federal Funds Rate						
P10	-0.3086**	0.0550	0.0276	0.0010	0.0154	0.0371
	(-2.28)	(1.49)	(1.01)	(0.10)	(1.52)	(1.51)
P90	0.5874***	0.0257	-0.0978***	0.0235***	0.0088	-0.0336
	(14.33)	(0.84)	(-3.49)	(2.99)	(0.85)	(-1.34)
p-value (P90 - P10)	**0.0000**	0.5622	**0.0018**	**0.0991**	0.6576	**0.0506**
by Credit Spread						
P10	0.6200***	0.1030***	-0.0280	0.0240***	0.0520***	0.0620***
	(13.23)	(3.83)	(-1.23)	(3.25)	(4.97)	(2.81)
P90	0.6453***	0.0978***	-0.0400	0.0226**	0.0493***	0.0110
	(10.29)	(3.03)	(-1.63)	(2.46)	(4.24)	(0.47)
p-value (P90 - P10)	0.7198	0.8876	0.6746	0.9142	0.8621	**0.0773**
by Term Spread						
P10	0.6919***	0.0943***	-0.0361	0.0394***	0.0542***	0.0350
	(11.07)	(3.02)	(-1.31)	(4.69)	(4.42)	(1.41)
P90	0.5639***	0.1075***	-0.0304	0.0063	0.0474***	0.0424*
	(8.32)	(2.99)	(-1.10)	(0.73)	(3.83)	(1.69)
p-value (P90 - P10)	0.2043	0.7883	0.8861	**0.0117**	0.7210	0.8352
by Net Private Saving						
P10	0.6473***	0.1118***	-0.0246	0.0143**	0.0499***	0.0418**
	(14.04)	(4.44)	(-1.20)	(2.20)	(5.40)	(2.16)
P90	0.6127***	0.0895***	-0.0433**	0.0335***	0.0521***	0.0374*
	(12.90)	(3.42)	(-2.01)	(4.90)	(5.33)	(1.81)
p-value (P90 - P10)	0.4300	0.3370	0.3075	**0.0155**	0.8363	0.8149
by Real GDP Growth						
P10	0.6079***	0.0933***	-0.0375	0.0289***	0.0644***	0.0377*
	(10.61)	(3.16)	(-1.50)	(3.74)	(5.81)	(1.74)
P90	0.6457***	0.1099***	-0.0319	0.0189**	0.0369***	0.0520**
	(10.72)	(3.53)	(-1.25)	(2.43)	(3.16)	(2.13)
p-value (P90 - P10)	0.6509	0.6766	0.8685	0.3737	**0.0928**	0.6303
by CPI Index						
P10	0.0309	0.0518*	0.0013	0.0072	0.0043	0.0402*
	(0.47)	(1.68)	(0.06)	(0.87)	(0.41)	(1.74)
P90	0.9558***	0.1157***	-0.0722**	0.0410***	0.0786***	0.0197
	(16.74)	(3.31)	(-2.35)	(4.82)	(6.29)	(0.79)
p-value (P90 - P10)	**0.0000**	0.1736	**0.0557**	**0.0077**	**0.0000**	0.5332

Table 6: Hurricane Risk and Other Loan Characteristics

This Table presents the AME of storm event on other loan features. For binary variables such as Performance Pricing, Credit line, and deal purposes, we estimate the probability of the loan having those characteristics using the probit model in eq. (1). For continuous dependent variables such Upfront Fee, and Number of Lenders we analyze the change in these loan terms using the linear model in eq. (2). For the variable Required Lenders, we use a fractional probit model. Standard errors are adjusted for clustering at the firm level. All variables are defined in the Appendix. t statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A.M.E of Storm Event on Other Loan Features

	(1) Perf. Pricing	(2) Credit Line	(3) Upfront Fee	(4) Num. of Lenders	(5) Required Lender
Post Storm Event	0.0718***	0.0045	0.0179	-0.0891	-0.0018
	(9.53)	(0.79)	(0.19)	(-0.24)	(-0.88)
by Firm Size					
P10	0.1299***	0.0231***	0.0678	-0.8945	0.0045
	(9.76)	(3.28)	(0.40)	(-1.63)	(1.24)
P90	0.0138	-0.0218*	-0.0170	0.5517	-0.0088**
	(1.22)	(-1.92)	(-0.11)	(0.68)	(-2.31)
p-value (P90 - P10)	**0.0000**	**0.0034**	0.7519	0.2301	**0.0325**
by Market-to-Book					
P10	0.0775***	0.0045	-0.0255	-0.3361	-0.0050*
	(8.12)	(0.63)	(-0.22)	(-0.75)	(-1.87)
P90	0.0640***	0.0045	0.0923	0.2883	0.0026
	(5.91)	(0.56)	(0.80)	(0.51)	(0.97)
p-value (P90 - P10)	0.3238	0.9987	0.4179	0.3430	**0.0317**
by Leverage					
P10	0.0841***	0.0075	-0.0138	-0.5063	0.0015
	(6.82)	(0.89)	(-0.10)	(-0.92)	(0.49)
P90	0.0594***	0.0013	0.0448	0.3146	-0.0050
	(4.92)	(0.14)	(0.29)	(0.42)	(-1.52)
p-value (P90 - P10)	0.1999	0.6551	0.8018	0.4442	0.1745
by Asset Tangibility					
P10	0.0738***	-0.0067	0.1494	0.0885	-0.0017
	(6.73)	(-0.81)	(1.08)	(0.15)	(-0.57)
P90	0.0690***	0.0201*	-0.1597	-0.3445	-0.0020
	(4.97)	(1.80)	(-0.94)	(-0.62)	(-0.41)
p-value (P90 - P10)	0.8061	**0.0874**	0.2041	0.6173	0.9611
by Credit Rating					
Unrated	0.0944***	0.0153**	0.0875	-0.4408	0.0004
	(9.84)	(2.14)	(0.71)	(-1.26)	(0.13)
Speculative Grade	0.0470***	-0.0015	-0.0015	-0.3927	0.0020
	(3.16)	(-0.12)	(-0.01)	(-0.39)	(0.50)
Investment Grade	0.0429**	-0.0131	-0.1489	0.6477	-0.0087**
	(2.43)	(-1.06)	(-0.77)	(0.92)	(-2.26)
p-value (IG - Unrated)	**0.0101**	**0.0470**	0.2840	0.1680	**0.0575**
by Relationship Lending					
Transactional	0.0848***	0.0125	0.0830	-0.3774	0.0021
	(8.65)	(1.64)	(0.67)	(-0.86)	(0.76)
Relationship	0.0583***	-0.0069	0.0348	0.6800	-0.0032
	(5.28)	(-0.87)	(0.29)	(1.38)	(-1.22)
p-value (Rel -Trans)	**0.0607**	**0.0676**	0.7473	**0.0572**	0.1328

Table 7: Hurricane Risk and Deal Purpose

This Table presents the AME of storm event on other loan features. We estimate the probability of the loan being issued for a specific purpose using the probit model in eq. (1). Standard errors are adjusted for clustering at the firm level. All variables are defined in the Appendix. t statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A.M.E of Storm Event on Deal Purpose

	(1) Corp. Purp	(2) Acquisition	(3) Working Cap.	(4) Debt Repay.	(5) Other Purp.
Post Storm Event	0.0123	0.0068	-0.0014	-0.0155***	-0.0030
	(1.56)	(1.16)	(-0.21)	(-2.66)	(-0.96)
by Firm Size					
P10	-0.0070	-0.0075	-0.0061	0.0145	0.0014
	(-0.69)	(-0.57)	(-0.60)	(1.46)	(0.54)
	(1.51)	(1.23)	(-0.19)	(-3.30)	(-0.90)
P90	0.0332**	0.0083*	0.0035	-0.0441***	-0.0166
	(2.32)	(1.82)	(0.30)	(-4.72)	(-1.63)
p-value (P90 - P10)	**0.0463**	0.3007	0.5829	**0.0001**	0.1045
by Market-to-Book					
P10	0.0266***	-0.0028	0.0081	-0.0280***	-0.0068*
	(2.74)	(-0.37)	(0.98)	(-3.27)	(-1.93)
	(2.18)	(0.45)	(0.35)	(-3.04)	(-1.49)
P90	-0.0085	0.0188**	-0.0145	0.0013	0.0031
	(-0.73)	(2.36)	(-1.50)	(0.15)	(0.62)
p-value (P90 - P10)	**0.0141**	**0.0312**	**0.0582**	**0.0243**	**0.0850**
by Leverage					
P10	0.0094	0.0051	-0.0138	-0.0047	-0.0005
	(0.76)	(0.54)	(-1.23)	(-0.61)	(-0.09)
	(1.55)	(1.16)	(-0.17)	(-2.41)	(-0.90)
P90	0.0151	0.0083	0.0102	-0.0279**	-0.0054
	(1.14)	(0.89)	(0.96)	(-2.57)	(-1.05)
p-value (P90 - P10)	0.7771	0.8290	0.1658	0.1120	0.5424
by Asset Tangibility					
P10	0.0004	0.0129	-0.0177*	0.0009	-0.0005
	(0.03)	(1.44)	(-1.84)	(0.11)	(-0.11)
P90	0.0290*	-0.0016	0.0224*	-0.0393***	-0.0070
	(1.87)	(-0.15)	(1.65)	(-3.41)	(-1.08)
p-value (P90 - P10)	0.1957	0.3636	**0.0333**	**0.0119**	0.4540
by Credit Rating					
Unrated	0.0087	-0.0013	-0.0044	-0.0043	-0.0012
	(0.87)	(-0.17)	(-0.52)	(-0.52)	(-0.29)
Speculative Grade	0.0308*	0.0137	-0.0109	-0.0296**	-0.0061
	(1.74)	(1.00)	(-0.85)	(-2.00)	(-0.79)
Investment Grade	0.0044	0.0179*	0.0137	-0.0261***	-0.0042
	(0.26)	(1.71)	(0.91)	(-3.05)	(-0.68)
p-value (IG - Unrated)	0.8274	0.1379	0.2899	**0.0638**	0.6844
by Relationship Lending					
Transactional	-0.0025	0.0055	-0.0100	0.0031	0.0002
	(-0.24)	(0.66)	(-1.14)	(0.37)	(0.04)
Relationship	0.0190*	0.0113	0.0064	-0.0319***	-0.0029
	(1.66)	(1.55)	(0.65)	(-4.03)	(-0.81)
p-value (Rel - Trans)	0.1459	0.5869	0.1930	**0.0017**	0.6054

Table 8: Hurricane Risk and Market Segment Selection

This Table presents the AME of storm event on the probability of the loan being classified in a specific market segment. We estimate the probability of the loan being classified in each market segment using the probit model in eq. (1). Standard errors are adjusted for clustering at the firm level. All variables are defined in the Appendix. t statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A.M.E of Storm Event on Market Segment Selection

	(1) Institutional	(2) Leveraged	(3) Highly Leveraged	(4) Non-Investment Grade	(5) Covenant Lite
Post Storm Event	0.0119**	0.0812***	0.0562***	0.0970***	0.0009
	(2.26)	(8.30)	(5.99)	(12.27)	(0.26)
by Firm Size					
P10	0.0036	0.1301***	0.1035***	0.1674***	-0.0020
	(0.53)	(9.27)	(7.45)	(12.80)	(-0.72)
P90	0.0233*	0.0181	-0.0081	0.0293***	0.0069
	(1.75)	(1.01)	(-0.40)	(2.84)	(0.76)
p-value (P90 - P10)	0.2604	**0.0000**	**0.0001**	**0.0000**	0.3882
by Market-to-Book					
P10	0.0055	0.0767***	0.0455***	0.1013***	0.0007
	(0.75)	(6.33)	(3.77)	(9.89)	(0.17)
P90	0.0212**	0.0885***	0.0722***	0.0910***	0.0012
	(2.57)	(6.09)	(5.17)	(8.63)	(0.21)
p-value (P90 - P10)	0.1710	0.5051	0.1351	0.4455	0.9395
by Leverage					
P10	0.0192***	0.0745***	0.0567***	0.0776***	0.0083*
	(3.04)	(4.90)	(4.43)	(6.93)	(1.82)
P90	0.0028	0.0875***	0.0536***	0.1163***	-0.0065
	(0.29)	(5.24)	(3.15)	(8.65)	(-1.10)
p-value (P90 - P10)	0.1816	0.6071	0.8932	**0.0422**	**0.0647**
by Asset Tangibility					
P10	0.0184**	0.0685***	0.0543***	0.0913***	0.0013
	(2.33)	(5.01)	(3.93)	(8.74)	(0.19)
P90	0.0039	0.1010***	0.0591***	0.1073***	0.0005
	(0.41)	(5.28)	(3.42)	(6.25)	(0.10)
p-value (P90 - P10)	0.2937	0.2119	0.8454	0.4721	0.9270
by Credit Rating					
Unrated	0.0204***	0.1278***	0.1044***	0.1259***	0.0036
	(3.48)	(9.47)	(8.10)	(12.59)	(1.14)
Speculative Grade	-0.0099	0.0316	-0.0140	0.0578***	-0.0216**
	(-0.66)	(1.58)	(-0.64)	(4.03)	(-1.97)
Investment Grade	0.0112	0.0259	0.0215*	0.0681***	0.0153***
	(1.39)	(1.61)	(1.76)	(3.40)	(2.85)
p-value (IG - Unrated)	0.3534	**0.0000**	**0.0000**	**0.0093**	**0.0592**
by Relationship Lending					
Transactional	0.0129*	0.1020***	0.0782***	0.1126***	0.0066*
	(1.81)	(7.54)	(5.72)	(11.02)	(1.72)
Relationship	0.0054	0.0581***	0.0305**	0.0773***	-0.0051
	(0.81)	(4.65)	(2.56)	(7.99)	(-0.98)
p-value (Rel - Trans)	0.4188	**0.0105**	**0.0052**	**0.0068**	**0.0607**

Table 9: Hurricane Risk and Loan Amendment

This Table presents the AME of storm event on the probability of the being amended, and conditional on the being amended, have a change in the deal amount. For binary dependent variable, such as *Deal Amended*, we use the probit model in eq. (1). For the count variable *Number of Amendment*, we use a zero inflated poisson model similar to eq. (3). For the continuous variable Average *Months between Amendments*, we use the linear model in eq. (2). Standard errors are adjusted for clustering at the firm level. All variables are defined in the Appendix. t statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A.M.E of Storm Event on Likelihood of Renegotiation and Renegotiation Outcomes

	Deal Amended			Deal Amount Amended		
	(1) Deal Amended	(2) Number of Amendment	(3) Months between Amendments	(4) Amount Changed	(5) Amount Increased	(6) Amount Decreased
Post Storm Event	0.0468***	0.1029***	-1.0215	0.0325*	0.0374**	0.0033
	(8.56)	(5.58)	(-0.91)	(1.75)	(2.36)	(0.23)
by Firm Size						
P10	0.0676***	0.1821***	-1.9825	0.0395	0.0268	0.0403
	(6.43)	(2.97)	(-1.04)	(1.32)	(1.06)	(1.38)
P90	0.0287***	0.0543***	-0.1766	0.0242	0.0494*	-0.0176
	(3.75)	(2.94)	(-0.09)	(0.81)	(1.82)	(-1.11)
p-value (P90 - P10)	**0.0084**	**0.0741**	0.5675	0.7458	0.5858	0.1160
by Market-to-Book						
P10	0.0531***	0.1115***	-1.5830	0.0272	0.0279	0.0076
	(7.40)	(4.23)	(-1.12)	(1.12)	(1.39)	(0.39)
P90	0.0381***	0.0918***	-0.1786	0.0395	0.0500**	-0.0021
	(4.84)	(3.47)	(-0.12)	(1.49)	(2.28)	(-0.10)
p-value (P90 - P10)	0.1473	0.6053	0.4664	0.7228	0.4231	0.7307
by Leverage						
P10	0.0501***	0.1059***	-1.3927	0.0066	0.0110	0.0054
	(5.58)	(3.93)	(-0.76)	(0.22)	(0.41)	(0.23)
P90	0.0436***	0.0981***	-0.7443	0.0574**	0.0619***	0.0012
	(5.20)	(3.37)	(-0.49)	(1.98)	(2.58)	(0.05)
p-value (P90 - P10)	0.6263	0.8547	0.7925	0.2777	0.1956	0.9086
by Asset Tangibility						
P10	0.0458***	0.0808***	0.0259	-0.0133	-0.0020	0.0005
	(5.73)	(3.16)	(0.02)	(-0.49)	(-0.08)	(0.02)
P90	0.0483***	0.1368***	-2.6998	0.1045***	0.1010***	0.0076
	(4.61)	(3.68)	(-1.15)	(2.63)	(2.92)	(0.26)
p-value (P90 - P10)	0.8675	0.2658	0.3897	**0.0324**	**0.0323**	0.8605
by Credit Rating						
Unrated	0.0464***	0.0924***	-1.8098	0.0321	0.0388*	0.0012
	(6.33)	(3.58)	(-1.26)	(1.30)	(1.74)	(0.07)
Speculative Grade	0.0388***	0.0719	0.5320	0.0665**	0.0367	0.0460*
	(2.93)	(1.61)	(0.34)	(2.01)	(1.40)	(1.85)
Investment Grade	0.0500***	0.0982***	-3.4050	-0.0463	0.0364	-0.0950**
	(5.57)	(5.07)	(-0.91)	(-0.91)	(0.91)	(-2.26)
p-value (IG - Unrated)	0.7539	0.8530	0.6876	0.1630	0.9582	**0.0369**
by Relationship Lending						
Transactional	0.0506***	0.0933***	-1.0833	-0.0003	0.0156	-0.0006
	(6.86)	(3.37)	(-0.68)	(-0.01)	(0.67)	(-0.03)
Relationship	0.0420***	0.1051***	-0.8223	0.0673***	0.0605***	0.0083
	(5.34)	(4.51)	(-0.62)	(2.67)	(2.76)	(0.43)
p-value (Rel -Trans)	0.4019	0.7319	0.8741	**0.0587**	0.1500	0.7559

Table 10: Hurricane Risk and Loan Amendment, Continued

This Table presents the AME of storm event on the probability of having a change in the deal maturity or spread after an amendment. For binary dependent variable, such as *Maturity Increased*, we use the probit model in eq. (1). Standard errors are adjusted for clustering at the firm level. All variables are defined in the Appendix. t statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A.M.E of Storm Event on Likelihood of Renegotiation and Renegotiation Outcomes

	Deal Maturity Amended			Deal Spread Amended		
	(1) Maturity Changed	(2) Maturity Increased	(3) Maturity Decreased	(4) Spread Changed	(5) Spread Increased	(6) Spread Decreased
Post Storm Event	-0.0039	0.0149	-0.0086	-0.0099	0.0083	-0.0165
	(-0.26)	(1.27)	(-0.78)	(-0.58)	(0.58)	(-1.26)
by Firm Size						
P10	-0.0203	0.0216	-0.0404	0.0244	0.0400	0.0072
	(-0.72)	(1.02)	(-1.39)	(0.85)	(1.50)	(0.27)
P90	0.0094	0.0086	0.0078	-0.0352	-0.0156	-0.0279*
	(0.42)	(0.50)	(0.64)	(-1.46)	(-0.74)	(-1.69)
$p-$value (P90 - P10)	0.4624	0.6718	0.1747	0.1565	0.1472	0.3089
by Market-to-Book						
P10	0.0025	0.0132	0.0164	-0.0100	0.0024	-0.0126
	(0.13)	(0.92)	(1.15)	(-0.44)	(0.12)	(-0.73)
P90	-0.0123	0.0170	-0.0389**	-0.0096	0.0153	-0.0213
	(-0.58)	(1.07)	(-2.28)	(-0.39)	(0.77)	(-1.11)
$p-$value (P90 - P10)	0.5686	0.8441	**0.0135**	0.9890	0.6581	0.7356
by Leverage						
P10	0.0161	0.0293	-0.0113	-0.0191	-0.0058	-0.0130
	(0.66)	(1.48)	(-0.64)	(-0.69)	(-0.26)	(-0.59)
P90	-0.0243	0.0006	-0.0059	-0.0006	0.0224	-0.0199
	(-0.94)	(0.03)	(-0.32)	(-0.02)	(0.99)	(-0.90)
$p-$value (P90 - P10)	0.3121	0.3516	0.8499	0.6713	0.4215	0.8463
by Asset Tangibility						
P10	-0.0174	0.0006	-0.0256	0.0024	0.0130	-0.0234
	(-0.75)	(0.03)	(-1.47)	(0.09)	(0.62)	(-1.17)
P90	0.0160	0.0385	0.0154	-0.0287	0.0009	-0.0061
	(0.56)	(1.63)	(0.81)	(-0.85)	(0.03)	(-0.24)
$p-$value (P90 - P10)	0.4263	0.2493	0.1615	0.5142	0.7621	0.6421
by Credit Rating						
1.se_affected_yr1						
Unrated	-0.0105	0.0170	-0.0211	-0.0081	0.0147	-0.0119
	(-0.50)	(0.98)	(-1.44)	(-0.37)	(0.79)	(-0.77)
Speculative Grade	0.0183	0.0282	0.0069	0.0301	0.0004	0.0177
	(0.68)	(1.62)	(0.32)	(0.99)	(0.01)	(0.81)
Investment Grade	-0.0338	-0.0283	0.0071	-0.1118**	-0.0010	-0.1271**
	(-0.88)	(-0.93)	(0.26)	(-2.19)	(-0.03)	(-2.52)
$p-$value (IG - Unrated)	0.5958	0.1938	0.3720	**0.0624**	0.7006	**0.0298**
by Relationship Lending						
Transactional	0.0101	0.0189	0.0157	-0.0259	-0.0054	-0.0237
	(0.42)	(0.96)	(0.93)	(-1.06)	(-0.26)	(-1.28)
Relationship	-0.0101	0.0120	-0.0254*	-0.0052	0.0212	-0.0204
	(-0.51)	(0.83)	(-1.73)	(-0.21)	(1.08)	(-1.11)
$p-$value (Rel -Trans)	0.5163	0.7788	**0.0705**	0.5428	0.3456	0.8976