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Corporate Bond Refinancing Under Capital Supply Uncertainty

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Abstract

Corporate bond refinancing, which replaces existing debt with new issuances, unlike issuance for new financing needs, faces a fixed maturity deadline. This deadline makes the firm's bond refinance decision take different responses to capital supply uncertainty. In this paper, I examine the effect of capital supply uncertainty – measured as the average flow volatility of mutual fund investors holding the bond – on firms' refinancing decisions on the bond. My main finding is that the capital supply uncertainty has a positive and significant impact on high-yield bond refinancing. These results highlight a novel fact that capital supply uncertainty can make firms' refinancing decisions sooner rather than later.

JEL Classification: G32, G23

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1 Introduction

Unlike bond issuance for new financing needs, corporate bond refinancing is governed by a clear deadline—maturity. Refinancing involves replacing existing debt with new bond issuances, and firms must either retire or roll over outstanding bonds upon maturity. This maturity constraint introduces a time-sensitive dimension to refinancing decisions, particularly when credit market conditions are volatile. As the U.S. corporate bond market has expanded to over $10 trillion in outstanding debt, with more than $1 trillion scheduled to mature annually in the coming years, refinancing has become a central component of firms' financial strategies. In particular, the high-yield segment is especially significant, with more than $300 billion in bonds scheduled to mature in 2026. Figure 1 illustrates the maturity wall of high-yield bonds.

While much of the literature has examined how credit supply conditions affect new bond issuance (e.g., Massa et al., 2013; Zhu, 2021), relatively less attention has been paid to refinancing decisions, despite their distinct timing pressures and investor dynamics. Refinancing is not merely another bond issuance—it is a constrained decision made under the shadow of an impending maturity deadline and amid uncertainty about the behavior of current bondholders. This paper focuses on refinancing as a unique and understudied aspect of corporate financial behavior.

Institutional details further underscore the importance of refinancing. U.S. speculative-grade issuers face rollover risk, when primary markets seize and investors effectively "go on strike." To insure against such shutdowns, high-yield bonds are commonly issued with call features to refinance early and extend maturities when rollover risk looms. These contractual designs allow firms to actively manage effective maturity through early calls and preemptive issuance (Xu, 2017). The decision to call or to issue is shaped by prevailing interest rates and credit spreads, the proximity of maturity walls, and the risk of market closure. In this environment, the fixed maturity deadline transforms instability in investor demand into a timing problem under rollover risk: when funding reliability is uncertain, firms refinance bonds as a form of insurance.

Using matched data on firm bond refinancing and mutual fund holdings, I first show that mutual funds are around six times as likely to participate in the refinancing of bonds they already hold. This suggests that firms have strong incentives to consider their existing investors when planning refinancing. I then examine how capital-supply uncertainty—measured by the volatility of mutual fund flows holding a bond—affects refinancing behavior. The results show that greater flow volatility significantly increases the likelihood of refinancing prior to maturity, especially among high-yield (HY) bonds. In the baseline specification, a one-standard-deviation increase in bondholder flow volatility raises the probability of refinancing by 0.9 percentage point, representing about 21 percent of the unconditional refinancing rate for HY bonds. This effect is both statistically and economically significant, and it is robust across alternative specifications.

Overall, the findings highlight a novel fact that capital supply uncertainty, from institutional investors such as mutual funds, can accelerate corporate bond refinancing. Unlike new issuances, refinancing cannot be indefinitely postponed, providing a fresh lens through which to observe how capital supply frictions affect corporate financing choices. The evidence suggests that firms manage rollover risk by refinancing sooner rather than later when their capital supply is uncertain, providing new insights into the role of investors in shaping firm financing behavior.

Section 2 reviews the related literature. Section 3 provides the theoretical framework and predictions. Section 4 describes the data and key variable construction. Section 5.1 presents evidence on the role of mutual fund bondholders in refinancing. Section 5.2 estimates the impact of bondholder flow volatility on refinancing behavior, and Section 5.3 addresses endogeneity concerns. Section 6 concludes.

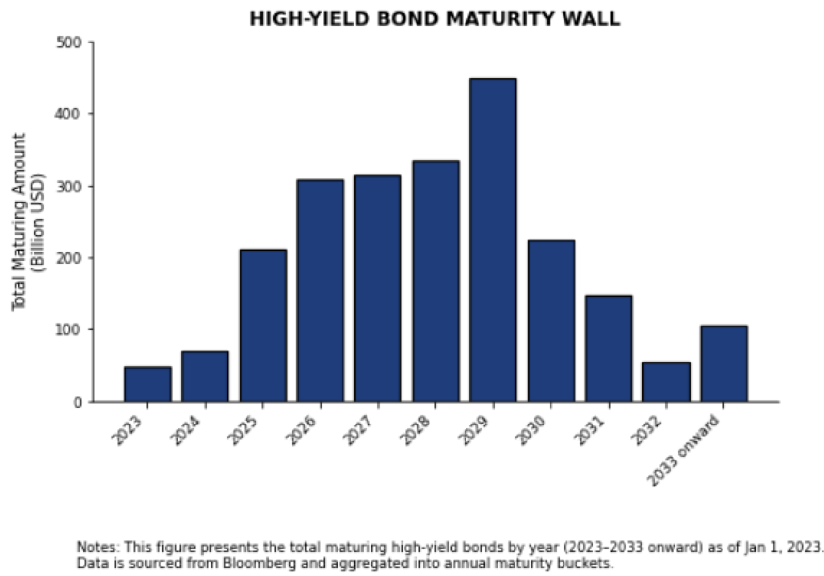


Figure 1: Aggregate High-Yield Bond Issuance Amount

2 Related Literature

The present paper relates to several strands of the literature. A substantial body of theoretical work highlights how liquidity constraints and rollover risk shape firms' debt maturity choices and refinancing behavior. Notably, Acharya et al. (2011) and He and Xiong (2012) model the strategic selection of debt maturity structures under the threat of creditor runs and liquidity-driven refinancing failure. Hugonnier, Malamud, and Morellec (2015) further develop a theoretical framework by emphasizing the role of capital supply uncertainty in firms' precautionary cash holdings and investment timing.

Empirical research on corporate bond refinancing also points to firms' strategic responses to market conditions. For instance, Longstaff and Tuckman (1994) and Xu (2017) document that firms actively refinance outstanding bonds to lock in lower interest rates or extend maturities. Relatedly, Ma et al. (2023) highlight how call provisions in high-yield bonds—via make-whole clauses and step-down call schedules—grant issuers flexibility to preempt rollover risk, especially when markets face episodic sudden-stop risk. Building on this empirical literature, the present paper focuses on refinancing decisions under capital supply uncertainty, examining how instability in the investor base, particularly bond mutual funds, affects the timing of refinancing.

A growing literature examines the role of institutional investors in corporate bond markets. As mutual funds now hold a significant and rising share of outstanding U.S. corporate bonds, their exposure to short-term investor flows has raised concerns about flow-driven liquidity shocks. Recent studies, including Bretscher et al. (2022), and Coppola (2025), show that mutual fund flow volatility can amplify price pressures and propagate disruptions in credit supply, especially during periods of financial stress.

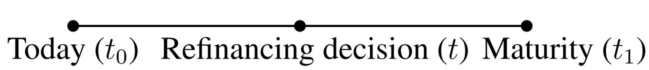
While most prior work, including Lemmon and Roberts (2010), Massa et al. (2013), and Zhu (2021), focuses on how credit supply shocks affect new bond issuance or firms' overall capital structure, this paper shifts the lens toward refinancing decisions, which are uniquely constrained by bond maturity deadlines. These constraints make refinancing particularly sensitive to fluctuations in capital supply.

3 Theoretical Framework

Consider a firm with an outstanding bond maturing at time t_1. At time $t < t_1$, the firm decides whether to refinance by issuing a new bond and retiring the old one. The firm's objective is to maximize its expected net gain from refinancing while considering interest rate variations and credit market conditions.

3.1 Graphical Representation

The following timeline illustration helps to visualize the refinancing decision over time, we :



3.2 Expected Gains

The expected gain of refinancing arise from the potential to reduce interest payments relative to the firm's existing debt. Let i_0 denote the bond yield the firm would face if it issued at time $t = 0$, and let i_t represent the expected bond yield at a future refinancing time t. The bond has a principal value of D, and future cash flows are discounted at a constant rate r. Then, the expected gains of refinancing at time t can be expressed as:

$$B_t = e^{-rt}\,\mathbb{E}_0\left[(i_0 - i_t)D\right]. \tag{1}$$

This equation captures the present value of interest savings from refinancing. When the expected yield at time t is lower than the yield prevailing at time 0, i.e., $i_t < i_0$, the refinancing decision generates a positive expected benefit. Thus, firms are more likely to refinance early when future borrowing conditions are anticipated to be more favorable, particularly in environments of declining interest rates.

3.3 Expected Losses

The firm faces uncertainty in obtaining refinancing due to fluctuations in capital supply. Assume current creditors appear to the firm with a Poisson arrival rate λ. Given that the firm is actively searching for refinancing, the probability of securing financing in any small interval $[t, t + dt]$ is λdt.

The expected loss from failing to refinance before t_1 is:

$$L_t = e^{-rt_1} \cdot \text{Cost}(D) \cdot \mathbb{P}_0(\text{not refinanced before } t_1). \tag{2}$$

Considering the Poisson process assumption, the probability of not securing refinancing by

t_1 is:

$$1 - \lambda(t_1 - t). \tag{3}$$

Thus, expected loss simplifies to:

$$L_t = e^{-rt_1} \cdot \text{Cost}(D) \cdot (1 - \lambda(t_1 - t)). \tag{4}$$

Higher capital supply uncertainty ($\lambda \downarrow$) increases expected losses, as does delaying refinancing to a later time ($t \uparrow$). The cost of failing to refinance could include deviations from the firm's optimal leverage goal, increased advertisement fees, and administrative costs associated with securing financing under stressed market conditions.

In this paper, I focus on the risk that current creditors may not arrive on time due to high uncertainty in their flows. In the empirical section 5, I first show that current bondholders are more likely to hold the refinanced bonds, suggesting that they should be treated as distinct from other holders. I then examine how the volatility of current bondholders flows, used as a measure of capital supply uncertainty, leads to bond refinance.

4 Data and Summary Statistics

In this section, I describe the data sources, define key variables, and summarize key data statistics.

4.1 Data Sources

The empirical analysis draws on multiple sources that collectively capture bond refinancing activity, firm characteristics and mutual fund investor behavior.

Corporate bond issuance and refinancing activity are obtained from Bloomberg's Fixed Income database. This dataset provides detailed information on each bond, including issuer name, coupon rate, issuance and maturity dates, maturity type, offering and outstanding amounts, call status, and inactive date (if retired). It also includes bond initial credit ratings, which allow classification into investment-grade and high-yield categories. Firm characteristics are obtained from WRDS Compustat Quarterly Fundamentals.

Mutual fund data are obtained from the Refinitiv Lipper database. The database provides detailed information on each fund, including portfolio holdings, total net assets, management strategy, launch date, and domicile. The data includes information on quarterly bond holdings, fund size (total net assets), management strategy, launch date, and country of domicile.

For bond holdings, mutual funds are required by the SEC to disclose portfolio holdings on Form N-PORT at the end of each fiscal quarter, with filings due within 60 days of quarter-end.[1] These filings provide a snapshot of bond and equity positions. Refinitiv Lipper augments these mandatory disclosures with data collected directly from fund management companies (FMCs), custodians, and third-party vendors. When FMCs provide monthly holdings data, Lipper prioritizes these direct feeds over public SEC filings. If monthly data are unavailable, the regulatory filings are incorporated to fill gaps.

4.2 Sample Construction

The main regression sample covers the period 2009–2023. I focus on non-convertible corporate bonds issued by U.S. firms, excluding those with embedded put options or floating rates. To avoid distortion from high call premiums, I include callable bonds but exclude those that remain in the make-whole call protection period. For mutual funds, I include both active and inactive bond funds, including ETFs, that hold U.S. corporate bonds.

I then merge Bloomberg, Lipper, and Compustat to form a panel of public U.S. nonfinancial firms with matched bond issuance, refinancing, and mutual fund flow data. The final

[1]Prior to 2019, portfolio holdings disclosure was made via Form N-Q. Funds also submit semiannual reports on Form N-CSR that include financial statements and holdings.

sample consists of bonds with at least one quarter of observable bondholder activity. [2]

4.3 Variable Definitions

4.3.1 Refinancing Definition

I define refinancing as the issuance of new debt within a three-month window centered on the month a bond is retired, consistent with existing literature (Xu, 2017). Specifically, a bond is considered refinanced if the issuing firm places new debt of comparable face value during this interval. This definition accommodates both refinancing at scheduled maturity and early refinancing.

4.3.2 Credit Rating Segmentation

Bonds are segmented according to their credit quality at issuance. A bond is classified as *High-Yield* if its initial credit rating is below investment grade—that is, rated below BBB− by Standard & Poor's or Fitch, or below Baa3 by Moody's. Conversely, bonds rated BBB−/Baa3 or higher are categorized as *Investment-Grade*.

4.4 Summary Statistics

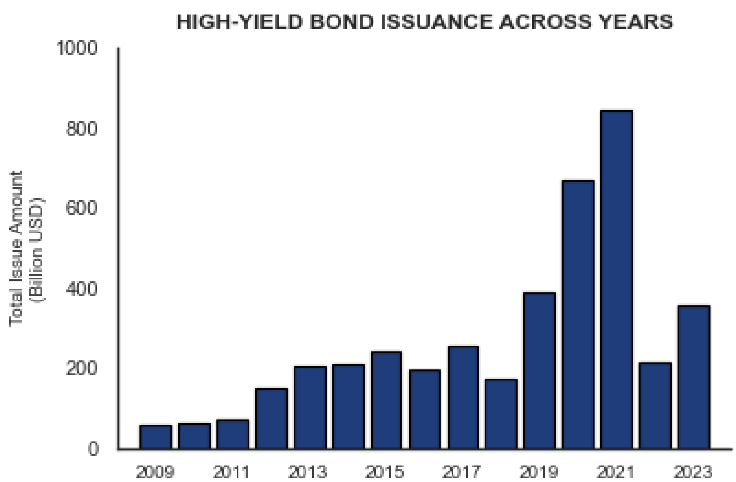
This study focuses on U.S. corporate bonds that were active as of January 1, 2009. I separately track refinancing activity across the high-yield and investment-grade segments.

High-Yield Bonds High-yield bond issuance demonstrates substantial time variations over the sample period, consistent with changes in aggregate credit conditions. As shown in Figure 2, annual issuance volume remains relatively modest until 2010, increases steadily through 2015, and experiences sharp expansions in 2020 and 2021—consistent with peri-

[2] The matching procedure follows Fang (2025).

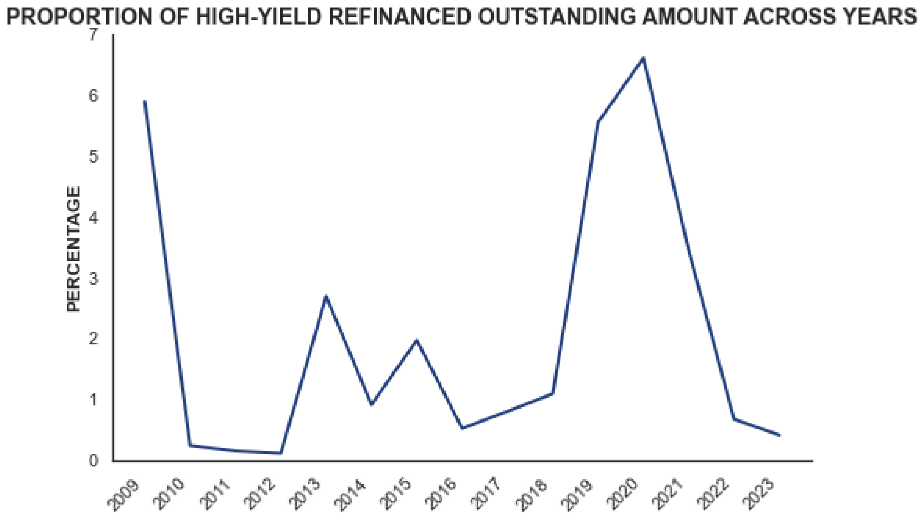
ods of a historically accommodative monetary environment. The issuance collapse in 2022 underscores the sensitivity of high-yield bond issuance to deteriorating credit supply.

Figure 3 presents the annual proportion of outstanding high-yield bonds that are refinanced. The refinancing ratio is highly cyclical, with large spikes in 2009 and the 2020–2021 window, and a collapse in 2022–2023. These patterns align with theoretical models of rollover risk, suggesting that firms accelerate high-yield bond refinancing when market conditions are favorable and delay or avoid issuance during periods of tightening liquidity.



Notes: This figure presents the total issuance of high-yield bonds annually from 2009 to 2023.
Data is sourced from Bloomberg and is calculated based on the defined criteria for high-yield bond classification.

Figure 2: Aggregate High-Yield Bond Issuance Amount



Notes: This figure presents the proportion of refinanced outstanding high-yield bonds annually from 2009 to 2023. The data is sourced from Bloomberg and is calculated based on the defined criteria for refinancing and high-yield bond classification. The ratio is computed relative to the total outstanding amount of high-yield bonds in each year.

Figure 3: High-Yield Bond Refinancing Proportion

Investment-Grade Bonds Investment-grade bond issuance is consistently larger in volume and less sensitive to short-term shocks. Figure 4 shows that issuance increases steadily through 2017, peaking in 2020 during the COVID period, and remains elevated despite modest declines thereafter. The muted cyclical variation reflects stable borrowing conditions and the stronger capital supply.

In contrast to their speculative-grade counterparts, firms' investment-grade bonds exhibit more consistent refinancing behavior. Figure 5 presents the annual refinancing ratio, defined as the amount of refinanced investment-grade bonds relative to the total amount outstanding. A notable increase is observed from 2019 onward, coinciding with a low-rate environment and improving market liquidity. However, the amplitude of variation remains lower compared to the high-yield segment, reflecting the more stable refinancing patterns typical of higher-rated issuers.

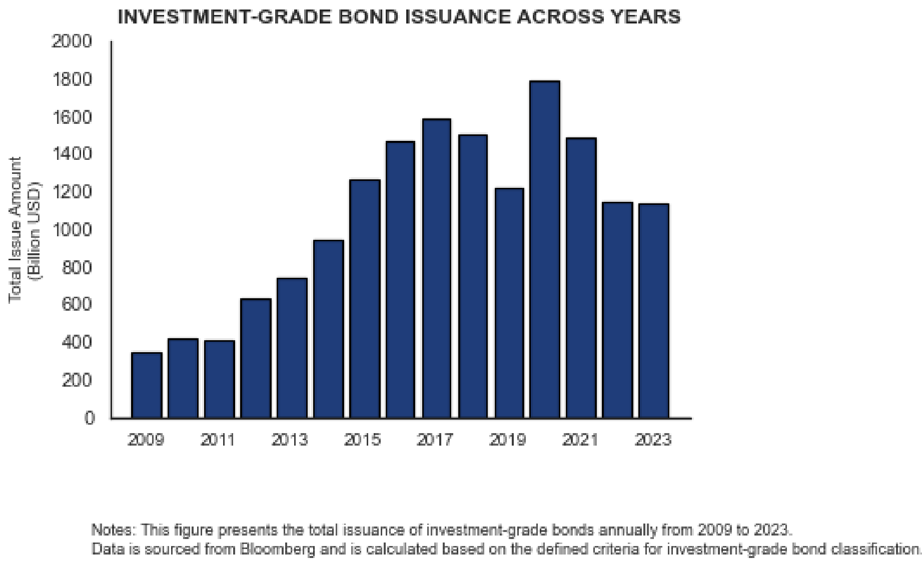


Figure 4: Aggregate Investment-Grade Bond Issuance Amount

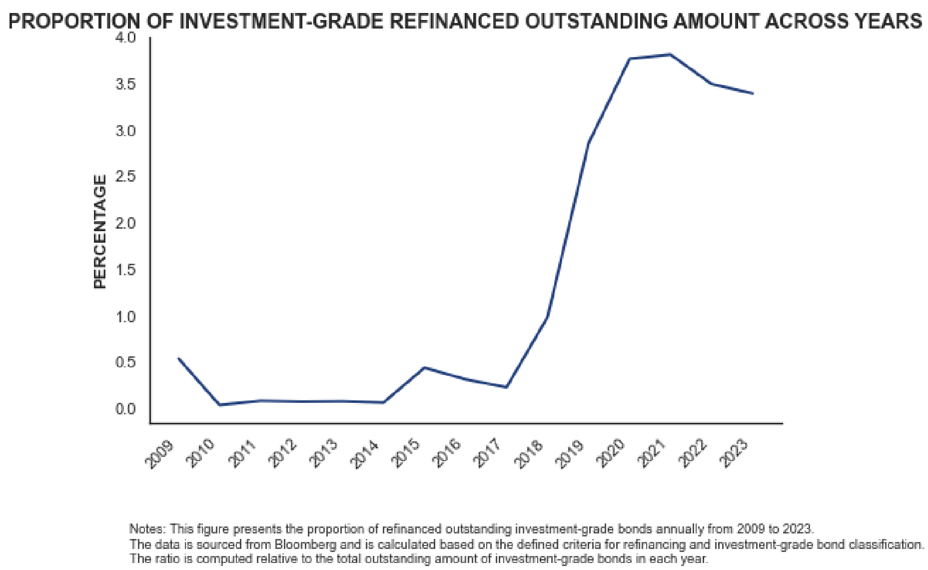


Figure 5: Investment-Grade Bond Refinancing Proportion

Mutual Funds The sample comprises all bond mutual funds, including ETFs, that hold corporate bonds. For example, it covers funds classified under categories such as Bond USD High Yield and Bond USD Medium Term. Both active funds (reported in Table 1) and inactive funds (reported in Table 2) are retained to ensure that the dataset is comprehensive and not biased by survivorship.

Table 1: Distribution of Active Bond Mutual Funds

Lipper Global	**Freq.**	**Percent**	**Cum.**
Absolute Return Bond USD	6	0.10	0.10
Bond CNY	1	0.02	0.12
Bond Emerging Markets Global HC	205	3.49	3.61
Bond Emerging Markets Global LC	68	1.16	4.77
Bond Global Corporates USD	**1**	**0.02**	**4.78**
Bond Global High Yield USD	**73**	**1.24**	**6.03**
Bond Global USD	**445**	**7.58**	**13.60**
Bond USD	**244**	**4.15**	**17.76**
Bond USD Corporates	**222**	**3.78**	**21.54**
Bond USD Government	99	1.69	23.22
Bond USD Government Short Term	76	1.29	24.51
Bond USD High Yield	**508**	**8.65**	**33.16**
Bond USD Inflation Linked	185	3.15	36.31
Bond USD Medium Term	**1,056**	**17.98**	**54.29**
Bond USD Mortgages	187	3.18	57.47
Bond USD Municipal	1,240	21.11	78.58
Bond USD Municipal High Yield	190	3.23	81.82
Bond USD Municipal MT	106	1.80	83.62
Bond USD Municipal ST	126	2.15	85.77
Bond USD Short Term	**491**	**8.36**	**94.13**
Loan Participation Funds	219	3.73	97.85
Mixed Asset USD Flex - Global	24	0.41	98.26
Mixed Asset USD Flex - US	55	0.94	99.20
Unclassified	47	0.80	100.00
Total	5,874	100.00	

Notes: Bolded rows indicate the categories included in the analysis.

Table 2: Distribution of Inactive Bond Mutual Funds

Lipper Global	**Freq.**	**Percent**	**Cum.**
Bond CNY	1	0.02	0.02
Bond Emerging Markets Global HC	177	4.09	4.12
Bond Emerging Markets Global LC	64	1.48	5.60
Bond Global High Yield USD	**47**	**1.09**	**6.69**
Bond Global USD	**285**	**6.59**	**13.28**
Bond USD	**261**	**6.04**	**19.32**
Bond USD Corporates	**179**	**4.14**	**23.46**
Bond USD Government	149	3.45	26.90
Bond USD Government Short Term	82	1.90	28.80
Bond USD High Yield	**421**	**9.74**	**38.54**
Bond USD Inflation Linked	130	3.01	41.55
Bond USD Medium Term	**715**	**16.54**	**58.08**
Bond USD Mortgages	106	2.45	60.54
Bond USD Municipal	1,063	24.59	85.13
Bond USD Municipal High Yield	67	1.55	86.68
Bond USD Municipal MT	53	1.23	87.90
Bond USD Municipal ST	50	1.16	89.06
Bond USD Short Term	**327**	**7.56**	**96.62**
Loan Participation Funds	84	1.94	98.57
Mixed Asset USD Conservative	26	0.60	99.17
Mixed Asset USD Flex - US	1	0.02	99.19
Unclassified	35	0.81	100.00
Total	4,323	100.00	

Notes: Bolded rows indicate the categories included in the analysis.

5 Empirical Results

5.1 Mutual Funds as Repetitive Holders

A foundation question in this study is whether mutual funds that previously held a bond are more likely to reinvest in its refinanced bond once the original bond is retired. To examine this, I analyze the behavior of mutual funds and find that mutual funds are significantly more likely to invest in refinanced bonds of firms whose previous bonds they held.

To test this hypothesis, I match each newly issued refinanced bond with its corresponding retired bond and estimate a linear probability model:

$$D(Bondholder_{i',j,t}) = \alpha_{i',t} + \alpha_{j,t} + \beta F(Bondholder_{i,j,t-1}) + \epsilon_{i',j,t} \tag{5}$$

where i' is the refinanced new bond, j is the mutual fund, i is the retired old bond, and t represents the issuance quarter. The indicator variable D equals 1 if the mutual fund holds the refinanced bond at the end of the issuance quarter, while F equals 1 if the mutual fund held the retired bond one quarter earlier. Each observation represents a pair between a refinanced bond issuance and a mutual fund that exists in the offering quarter. The sample includes 1,407 distinct refinanced bond issuances and 1,228 mutual funds.

Table 3 presents regression results on mutual fund participation in bond refinancing. The key coefficient of interest—an indicator for whether a mutual fund held the retired version of the bond—is positive and highly statistically significant across all specifications. In the most saturated model, which includes both bond-by-quarter and fund-by-quarter fixed effects (Column 3), prior ownership of the old bond increases the probability of holding the refinanced bond by 16.2 percentage points. This effect is substantial relative to the baseline mean holding probability of 3.4%, representing almost a fivefold increase.

This strong association underscores the stickiness in mutual funds' reinvestment behavior and suggests that prior holders of a bond are considerably more likely to participate when the bond is refinanced. One potential explanation is that existing bondholders possess an informational advantage regarding the issuer's creditworthiness, which reduces the marginal cost of reinvestment decisions. The inclusion of two-way fixed effects ensures that this relationship is not driven by bond-specific demand shocks or fund-level investment capacity. These findings highlight the important role of mutual fund investors as capital suppliers in bond refinancing.

Table 3: Effect of Previous Holdings on Mutual Fund Participation in Refinanced Bonds

	Absorb bond_id×quarter	Absorb fund_id×quarter	Absorb Both
	(1)	(2)	(3)
F (Held Old Bond)	0.2555***	0.1687***	0.1618***
	(0.0020)	(0.0019)	(0.0019)
Constant	0.0333***	0.0338***	0.0338***
	(0.0001)	(0.0001)	(0.0001)
Observations	1,892,592	1,883,612	1,883,612
R^2	0.0246	0.1740	0.1858
Adj. R^2	0.0237	0.1462	0.1576
Fixed Effects	bond_id×quarter	fund_id×quarter	Both

Notes: This table reports estimates from high-dimensional fixed effects regressions. The dependent variable is an indicator for whether a fund holds a refinanced bond at time t. The independent variable is an indicator for whether the fund held the previous version of the bond in the preceding quarter. Standard errors clustered at the fund level are reported in parentheses. All regressions include fixed effects for bond-quarter, fund-quarter, or both as specified. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5.2 Mutual Funds Flow Uncertainty and Refinance Decision

To examine the relationship between bondholder capital supply conditions and firm refinancing behavior in bonds, I estimate the following linear probability and logit model at the bond-quarter level:

$$
\begin{aligned}
D(\text{Refinance}_{i,t} > 0) = f(&\alpha_s + \alpha_{r,t} + \beta_0 \text{BH Flow}_{i,t-1} + \beta_1 \text{BH Flow Volatility}_{i,t-1} \\
&+ \beta_2 \text{Time To Maturity}_{i,t} + \gamma X^{\text{Firm}}_{i,t-1} + \epsilon_{i,t})
\end{aligned} \tag{6}
$$

where $D(\text{Refinance}_{i,t} > 0)$ is an indicator equal to one if bond i is refinanced in quarter t, and zero otherwise. The model includes two-digit NAICS sector fixed effects α_s to control for industry-specific refinancing behavior and rating-by-quarter fixed effects $\alpha_{r,t}$ to absorb time-varying variation within credit rating groups, such as macroeconomic shocks and credit market conditions for each rating group. S&P initial ratings are used. Ratings-by-Quarter fixed effects are defined separately for AAA and AA tier, A tier, BBB tier, BB tier, B tier, and ratings below B–.

The key explanatory variables are $\text{BHFlow}_{i,t-1}$ and $\text{BH Flow Volatility}_{i,t-1}$, capturing the firm-bond capital supply and its uncertainty, respectively. These variables are constructed following the methodologies of Massa et al. (2013) and Zhu (2021). Specifically, $\text{BH Flow}_{i,t-1}$ represents the weighted average of net capital flows into bond mutual funds holding firm bond i, aggregated over the past four quarters and scaled by the bonds i's outstanding in the prior quarter:

$$
\text{BH Flow}_{i,t-1} = \frac{\sum_{j \in \mathcal{I}_i} \left(\text{Flow}_{j,t-5:t-1} \times \text{BondHolding}_{i,j,t-1}\right)}{\text{OutstandingBonds}_{i,t-1}} \tag{7}
$$

where $\text{Flow}_{j,t-5:t-1}$ is the cumulative net inflow into fund j over the previous four quarters, and $\text{BondHolding}_{i,j,t-1}$ denotes the amount of firm i's bonds held by fund j at time $t-1$.

Similarly, flow uncertainty is captured by $\text{BH Flow Volatility}_{i,t-1}$, defined as the weighted average of flow volatility across the same set of bondholding mutual funds. Specifically, fund-level flow volatility is computed as the standard deviation of monthly net flows over the preceding four quarters:

$$\text{BH Flow Volatility}_{i,t-1} = \frac{\sum_{j \in \mathcal{I}_i} \left(\text{FlowVolatility}_{j,t-5:t-1} \times \text{BondHolding}_{i,j,t-1}\right)}{\text{OutstandingBonds}_{i,t-1}} \quad (8)$$

Both variables are intended to capture bond-specific capital supply conditions arising from variation in mutual fund investor behavior.

Time to maturity, $\text{Time To Maturity}_{i,t}$, measures the number of quarters remaining until bond i's scheduled maturity. $X^{\text{Firm}}_{i,t-1}$ denotes a vector of lagged firm-level controls, including leverage, firm size, and cash holdings. Standard errors are clustered at the issuer level.

Table 4 presents estimates from linear probability models for the full sample, investment-grade (IG), and high-yield (HY) subsamples, as well as a logit specification for HY bonds with marginal effects reported in column (7). Across all specifications, bondholder (BH) flow volatility is positively associated with the likelihood of bond refinancing, while the average level of BH flows is statistically insignificant. This pattern suggests that firms respond more acutely to uncertainty in investor behavior than to the level of available capital.

Table 4: Effect of Bondholder Fund Flow Volatility on Refinance Probability

Dependent Variable	D(Refinance$_{i,t} > 0$)						
Specification	Linear Probability (Full Sample)	Linear Probability (Full Sample)	Linear Probability (IG Only)	Linear Probability (IG Only)	Linear Probability (HY Only)	Linear Probability (HY Only)	Logit (HY Only)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
BH Flow (standardized)	-0.001	-0.002	-0.001	-0.001	-0.017	-0.016	-0.005
	(0.002)	(0.002)	(0.002)	(0.002)	(0.009)	(0.011)	(0.008)
BH Flow Volatility (standardized)	0.003	0.003	0.003	0.002	0.011***	0.009**	0.016***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
Time to Maturity (ref: very short-term)							
Short-term (1–4 years)	-0.063***	-0.077***	-0.054***	-0.060***	-0.143**	-0.097**	-0.132***
	(0.018)	(0.021)	(0.017)	(0.018)	(0.063)	(0.049)	(0.051)
Medium-term (4–8 years)	-0.044*	-0.057**	-0.024	-0.027	-0.139***	-0.107**	-0.152***
	(0.023)	(0.023)	(0.023)	(0.024)	(0.062)	(0.050)	(0.049)
Long-term (>8 years)	0.013	-0.008	0.021	0.019	-0.087	-0.060	0.233*
	(0.032)	(0.029)	(0.032)	(0.034)	(0.074)	(0.090)	(0.125)
Leverage	0.031**	0.021	0.028	0.033	-0.020	-0.016	-0.016
	(0.014)	(0.013)	(0.017)	(0.019)	(0.029)	(0.035)	(0.065)
NAICS Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rating-by-Quarter FE	No	Yes	No	Yes	No	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,488	16,488	12,500	11,870	3,988	3,626	2,268
R^2 / Pseudo R^2	0.1101	0.1810	0.1357	0.1459	0.1675	0.2387	0.2570

Notes: Standard errors clustered at the issuer level are reported in parentheses. The dependent variable equals one if the bond is refinanced in a given quarter. Bondholder (BH) flows and volatilities are standardized and lagged by one quarter. The omitted time-to-maturity category includes bonds with four or fewer quarters remaining. Column (7) reports average marginal effects from a logit model evaluated at the mean. Ratings-by-Quarter fixed effects are defined separately for AAA and AA tier, A tier, BBB tier, BB tier, B tier, and ratings below B–. All regressions include controls for firm leverage, NAICS sector fixed effects, and quarter fixed effects. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Unconditionally, only 4.2% of high-yield bonds are refinanced in a given quarter. Column (6) shows that a one standard deviation increase in BH Flow Volatility is associated with a 0.9 percentage point increase in the probability of refinancing—equivalent to approximately 21% of the unconditional mean. The effect is statistically significant at the 5% level and remains robust across specifications, including the logit model reported in column (7).

In contrast, while the coefficients on BH Flow Volatility are also positive in the full sample and investment-grade (IG) subsample (columns 1 to 4), they are not statistically significant. Standard errors are clustered at the issuer level in all regressions to account for intra-firm correlation.

The positive and significant coefficients on BH Flow Volatility (columns 5, 6 and 7) within the HY sample are especially pronounced. In the logit specification, a one standard deviation increase in flow volatility raises the probability of refinancing by 1.6 percentage points. These results are consistent with theoretical framework, wherein firms choose to refinance preemptively when faced with greater investor flow uncertainty.

Consistent with the theoretical framework, the time to maturity of outstanding bonds exhibits strong predictive power. Relative to bonds with very short maturities ($\leq$1 year), those with short maturities (1–4 years) are significantly less likely to be refinanced—both in the high-yield (HY) and investment-grade (IG) segments. This pattern supports the prediction that firms facing imminent maturity cliffs are more likely to engage in precautionary refinancing.

The results support the theoretical prediction that capital supply uncertainty plays an important role in shaping corporate refinancing behavior. In particular, firms appear to base refinancing decisions on the stability of investor flows, with greater volatility prompting more proactive financial management. These findings highlight a novel fact that uncertainty in capital supply can accelerate firms' refinancing decisions, prompting them to act sooner rather than later.

5.3 Addressing Endogeneity Concerns

To address potential reverse causality concerns, I construct bondholder flow and flow volatility measures using data from four to eight quarters (i.e., 12 to 24 months) prior to the refinancing event. This mitigates the concern that investors could anticipate or respond to a firm's refinancing decision, as it is unlikely they would have known or expected such behavior that far in advance.

Table 5: Effect of Bondholder Fund Flow Volatility (Four Quarters Ahead) on Refinance Probability

Dependent Variable	D(Refinance$_{i,t} > 0$)					
Specification	Linear Probability (Full Sample)	Linear Probability (Full Sample)	Linear Probability (IG Only)	Linear Probability (IG Only)	Linear Probability (HY Only)	Linear Probability (HY Only)
	(1)	(2)	(3)	(4)	(5)	(6)
BH Flow (standardized)	-0.002	-0.003	-0.001	-0.002	-0.016	-0.023
	(0.003)	(0.003)	(0.003)	(0.003)	(0.014)	(0.016)
BH Flow Volatility (standardized)	0.001	0.001	0.001	0.001	0.015**	0.017**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.007)
Time to Maturity (ref: very short-term)						
Short-term (1–4 years)	-0.069***	-0.081***	-0.057**	-0.064***	-0.141**	-0.103**
	(0.019)	(0.023)	(0.020)	(0.020)	(0.067)	(0.049)
Medium-term (4–8 years)	-0.049**	-0.061**	-0.028	-0.033	-0.142**	-0.103**
	(0.024)	(0.025)	(0.025)	(0.027)	(0.069)	(0.050)
Long-term (>8 years)	-0.003	-0.014	0.017	0.015	-0.093	-0.052
	(0.030)	(0.030)	(0.035)	(0.037)	(0.074)	(0.090)
Leverage	0.033**	0.027*	0.031	0.036	-0.008	0.008
	(0.016)	(0.015)	(0.019)	(0.023)	(0.031)	(0.038)
NAICS Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating-by-Quarter FE	No	Yes	No	Yes	No	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,490	16,490	12,452	11,826	4,038	3,684
R^2 / Pseudo R^2	0.1062	0.1875	0.1229	0.1301	0.1672	0.2672

Notes: Bondholder (BH) flows and volatilities are standardized and lagged by four quarters.

Table 3 presents estimates from linear probability models for the full sample, investment-grade (IG), and high-yield (HY) subsamples, where bondholder flow and flow volatility are constructed using data four quarters ahead. Capital supply uncertainty continues to have a positive and statistically significant impact on high-yield bond refinancing, while the effect on investment-grade bond refinancing is positive but not statistically significant.

5.4 Instrumental Variable: Fund Volatility and Firm Bond Dependency

To address endogeneity concerns and estimate the causal impact of bondholder mutual fund flow volatility on corporate bond refinancing, I construct an instrumental variable (IV) using a shift-share approach. Specifically, the instrument is based on the interaction between bond fund flow volatility and firm-level dependence on bond financing. This strategy isolates exogenous variation in refinancing conditions driven by mutual fund activity rather than firm-specific factors.

Shift–share designs, which combine aggregate shocks with heterogeneous exposure weights, have recently been widely applied. In particular, Borusyak, Hull, and Jaravel (2025) provide a comprehensive guide to their implementation and inference, emphasizing the conditions under which the instrument can be interpreted as exogenous and the importance of properly accounting for heterogeneous exposure. Following this guidance, my approach treats mutual fund flow volatility as an aggregate shift that is plausibly exogenous to any individual firm, while firm-level bond financing dependence provides the share component that captures systematic heterogeneity in refinancing sensitivity.

5.4.1 Identification Strategy

The instrument is constructed as the interaction between average fund flow volatility and issuer firm bond dependency. It is defined as:

$$Z_{i,t} = \text{Fund Volatility}_t \times \text{Firm Bond Dependency}_i \tag{9}$$

Fund $\text{Volatility}_\text{t}$ captures the average across funds of time-varying volatilities in mutual fund flows into corporate bonds. It is measured as the standard deviation of net inflows to bond funds over a rolling window of four quarters. Firm Bond $\text{Dependency}_\text{i}$ reflects the extent to which the issuer of bond i relies on bond markets for external financing. It is measured as the ratio of bond debt to total debt in a predetermined base year, capturing heterogeneity in firms' exposure to bond market conditions.

The logic behind this instrument follows the shift-share methodology. Fund volatility serves as capital supply uncertainty that affects bond market conditions independently of any single firm's fundamentals. Predetermined firm bond dependency captures heterogeneous exposure to these shocks, ensuring that variation in the instrument is driven by market conditions rather than firm-specific refinancing decisions. This instrumental variable satisfies the exclusion restriction under the assumption that fund volatility influences refinancing decisions only through its impact on bond market conditions, and not through firm characteristics.

5.4.2 Instrumental Variable Results

Table 6 presents instrumental variable (IV) estimates of the effect of bondholder fund flow volatility on corporate bond refinancing decisions. Column (1) reports a baseline linear probability model for the full sample, while Column (2) shows IV estimates using a residualized volatility specification. Columns (3) and (4) restrict the sample to high-yield (HY) bonds and correspond to linear and IV models, respectively.

Across all specifications, the coefficient on BH Flow Volatility is positive, with the strongest and most statistically significant results concentrated in the high-yield subsample. Specifically, Column (4) shows that a one standard deviation increase in bondholder flow volatility is associated with a 2.3 percentage point increase in the probability of refinancing for HY bonds. Given the unconditional refinancing rate for HY bonds is approximately 4.2%, this represents a substantial economic effect—amounting to nearly a 55% increase relative to the baseline. For the full sample (Column 2), the coefficient on BH Flow Volatility is also positive. However, these estimates should be interpreted with caution due to concerns about weak instrument strength, which may contribute to imprecision in the results.

Table 6: Effect of Bondholder Fund Flow Volatility on Refinance Probability: IV Strategy

	Linear Probability (Full Sample) (1)	IV (Full Sample) (2)	Linear Probability (HY Only) (3)	IV (HY Only) (4)
BH Flow (standardized)	-0.001	-0.001	-0.017	-0.008
	(0.002)	(0.002)	(0.006)	(0.008)
BH Flow Volatility (standardized)	0.003	0.003	0.011***	0.013**
	(0.002)	(0.051)	(0.003)	(0.005)
Time to Maturity (ref: very short-term)				
Short-term (1–4 years)	-0.058***	-0.058***	-0.143**	-0.091
	(0.022)	(0.023)	(0.063)	(0.071)
Medium-term (4–8 years)	-0.034	-0.033	-0.139***	-0.096
	(0.025)	(0.028)	(0.062)	(0.067)
Long-term (>8 years)	0.013	0.013	-0.087	-0.094
	(0.032)	(0.031)	(0.074)	(0.071)
Leverage	0.021	0.022	-0.015	0.058
	(0.014)	(0.016)	(0.029)	(0.039)
NAICS Sector FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	12,500	12,408	3,988	3,939
R^2	0.1357	0.1412	0.1675	0.1703
First-stage F stat (KP)	—	8.80	—	7.02

Notes: Standard errors clustered at the issuer level are reported in parentheses. The dependent variable is a binary indicator equal to one if the bond is refinanced in a given quarter. Bondholder (BH) flows and volatilities are standardized and lagged by one quarter. The omitted time-to-maturity category includes bonds with four or fewer quarters remaining. All regressions include controls for firm leverage, NAICS sector fixed effects, and quarter fixed effects. First-stage F-statistics report the Kleibergen-Paap F-statistic for the excluded instrument. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5.4.3 Considerations of Alternative Instruments

Compared to using aggregate fund flows or broad financial indicators such as the VIX, my proposed IV directly links bond market fluctuations to firm-level exposure, minimizing endogeneity concerns. While VIX captures broader market uncertainty, it may influence refinancing through alternative channels, such as bank lending constraints. By contrast, my measure isolates the impact of bond mutual fund activity specifically.

This IV framework allows us to estimate the causal effect of bondholder flow volatility on refinancing decisions while addressing endogeneity concerns.

6 Model Calibration and Policy Implications

6.1 Model Setup

Let T_1 denote the random time to maturity, which we assume follows $T_1 \sim \mathcal{N}(4.5, 2)$ based on the empirical distribution of high–yield bond maturities. The risk–free rate is fixed at $r_f = 0.02$, and the principal is normalized to $D = 1$. The expected saving from refinancing at maturity reflects a spread reduction of $i_0 - i_t = 180$ bps $= 0.018$. If the firm successfully refinances at maturity, the discounted benefit is

$$B(T_1) \;=\; e^{-r_f T_1}\,(i_0 - i_t)\,D. \tag{10}$$

Flow uncertainty ϕ affects the investor demand through

$$\lambda \;=\; \lambda_0 \exp(\kappa\phi), \qquad p \;=\; \min\{1,\, \lambda T_1\}, \tag{11}$$

where $\phi \sim \mathcal{N}(0, 1)$. The cap $p \leq 1$ reflects that rollover success probability cannot exceed one (expected loss is nonnegative). The expected discounted loss from rollover failure is

$$L(T_1, \phi) \;=\; e^{-r_f T_1}\,(L_{\text{cost}} D)\,(1 - p), \tag{12}$$

with $L_{\text{cost}} = 10\%$. The net value of waiting is

$$V(T_1, \phi) \;\equiv\; B(T_1) - L(T_1, \phi). \tag{13}$$

Normalizing the value of immediate refinancing to zero, the firm's value function is

$$J(T_1, \phi) \;=\; \max\{0,\, V(T_1, \phi)\}. \tag{14}$$

Therefore, the optimal stopping rule is

$$\chi(T_1, \phi) \;=\; 1\{V(T_1, \phi) \le 0\} \;=\; 1\{B(T_1) < L(T_1, \phi)\}, \tag{15}$$

so the firm refinances immediately if the value of waiting is negative, and to wait otherwise.

Finally, the unconditional refinancing probability is given by

$$\delta \;\equiv\; \Pr\{B(T_1) < L(T_1, \phi)\}. \tag{16}$$

6.2 Calibration

The parameters (λ_0, κ) are chosen to match two empirical moments: (i) the baseline refinancing rate $\delta^{\text{data}} = 0.042$ when $\phi \sim \mathcal{N}(0, 1)$; and (ii) the pointwise sensitivity

$$\Delta \;\equiv\; \delta(\phi{=}1) - \delta(\phi{=}0) \;=\; 0.009. \tag{17}$$

The latent variable ϕ governs fluctuations in investor willingness to refinance, yet its scale is inherently indeterminate. I discipline the units of ϕ by normalizing it to the empirical distribution of bondholder flow volatility. Specifically, ϕ is standardized such that one unit corresponds to a one–standard deviation increase in observed bondholder flow volatility, computed as the weighted twelve–month standard deviation of mutual fund flows into the bonds' institutional holders with one quarter lag. This normalization does not impose that fund flows are the sole determinant of investor uncertainty, but rather provides an empirically interpretable scale for an otherwise latent factor.

Model moments are evaluated using Monte Carlo simulation with $N = 200{,}000$ draws and a fixed seed. A nested bisection procedure is employed: for a given λ_0, the inner loop solves for κ such that $\Delta = 0.009$; the outer loop then adjusts λ_0 to target $\delta^{\text{data}} = 0.042$.

Table 7: Calibrated parameters ($L_{\text{cost}} = 10\%$)

Parameter	Value
λ_0	0.831
κ	-0.058

Table 8: Targeted and model-implied moments ($L_{\text{cost}} = 10\%$)

Moment	Model	Target
Baseline refinancing probability δ	0.0420	0.0420
Sensitivity to ϕ (1 s.d.)	0.0090	0.0090

Monotonicity ensures that as λ_0 increases, p rises, L falls, and the refinancing probability δ declines.

Table 7 reports the calibrated parameters and Table 8 presents the targeted and model implied moments. We obtain $\lambda_0 = 0.831$ and $\kappa = -0.058$. By construction, the baseline refinancing probability $\delta(\phi \sim \mathcal{N}(0,1))$ matches the empirical target of 4.2%. Likewise, the model replicates the sensitivity Δ of 0.9 percentage points when moving from $\phi = 0$ to $\phi = 1$. This close fit indicates that the chosen specification is flexible enough to capture both the level and responsiveness of refinancing activity.

To validate the model, Table 9 compares the distribution of time–to–maturity at refinancing in the model to that observed in the data. The model generates refinancing at an average maturity of 1.52 years, which is reasonably close to the empirical mean of about two years. The dispersion of refinancing timing is smaller than in the data. Overall, the exercise indicates that the model not only matches the aggregate refinancing rate by construction, but also provides a realistic approximation of the timing dimension observed in the data.

6.3 Scenarios and Policy Implications

Giving the model, I study three different risk scerairos and compare the firm value with and without the option to call the bond and refinance early.

Table 9: Validation of refinancing timing (time to maturity)

	Mean (years)	Median (years)	Std. Dev. (years)
Model	1.52	1.84	0.86
Data	1.96	2.05	1.24

Notes: The model reproduces similar average refinancing timing as in the data, but with lower dispersion.

- No rollover risk: $L_{\text{cost}} = 0$, $\phi = 0$;
- Average rollover risk: $L_{\text{cost}} = 10\%$, $\phi = 0$;
- High rollover risk: $L_{\text{cost}} = 10\%$, $\phi = 1$.

I compare firm's value under these three different rollover risk scenarios. Table 10 presents the means of firm's value with and without the option to refinance. When rollover risk is absent ($L = 0$), outcomes coincide across regimes, as refinancing and waiting are equivalent. Under average risk, the refinancing option yields a modest value gain. With high rollover risk ($\phi = 1$), the option further cushions firm value, whereas forced waiting reduces present value substantially. This highlights the welfare relevance of refinancing flexibility in mitigating rollover losses.

Figure 6 to Figure 8 report the distribution of firm value, defined as $B(T_1) - L(T_1, \phi)$, across three scenarios. In the absence of rollover risk, all firms retain positive present value and thus have no incentive to refinance early. Under average rollover risk, a subset of firms refinance immediately, as waiting would reduce their value below zero. When rollover risk is high, the deterioration in firm value is even more pronounced, with a larger share of firms choosing to refinance early.

From a policy perspective, the absence of a call option—which forces firms to wait until maturity to refinance—can reduce firm value by more than 3% (Figures 9 and 10). The effect is particularly severe in environments with elevated rollover risk, underscoring the importance of well–functioning call structures and refinancing mechanisms that provide firms

Table 10: Refinancing share and firm present value across risk scenarios

Scenario	Refi share	PV (with option)	PV (forced to wait)
No risk ($L = 0$, $\phi = 0$)	0.000000	0.016456	0.016456
Average rollover risk ($L = 10\%$, $\phi = 0$)	0.042000	0.012583	0.012062
High rollover risk ($L = 10\%$, $\phi = +1$)	0.051000	0.012028	0.011420

Notes: PV columns report the per-$1 par present value of the refinancing decision.

with flexibility to mitigate rollover risk.

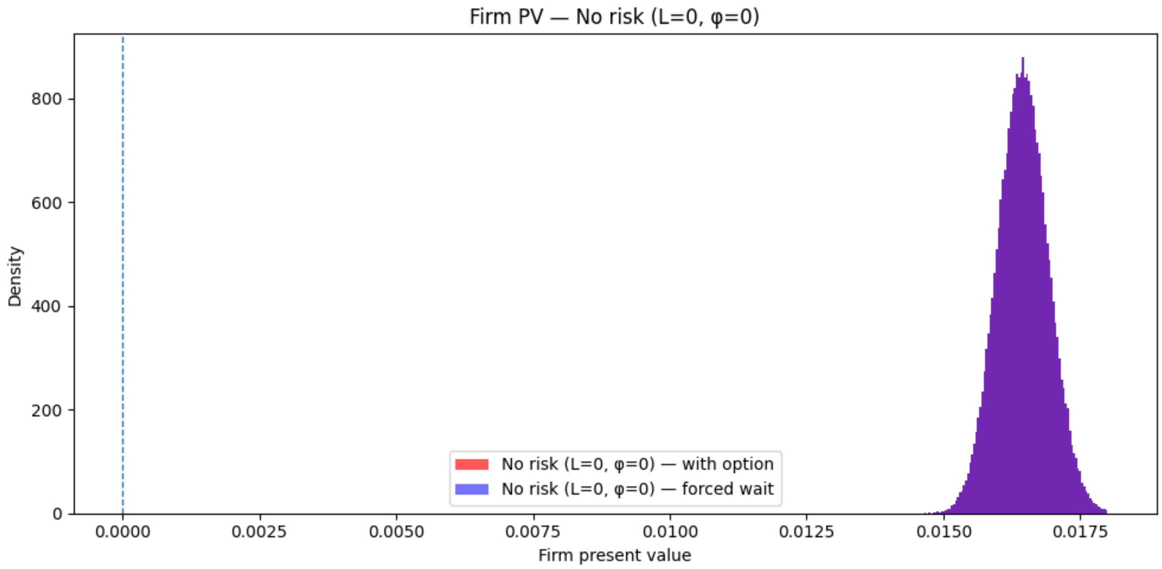


Figure 6: Firm present value distribution under no rollover risk.

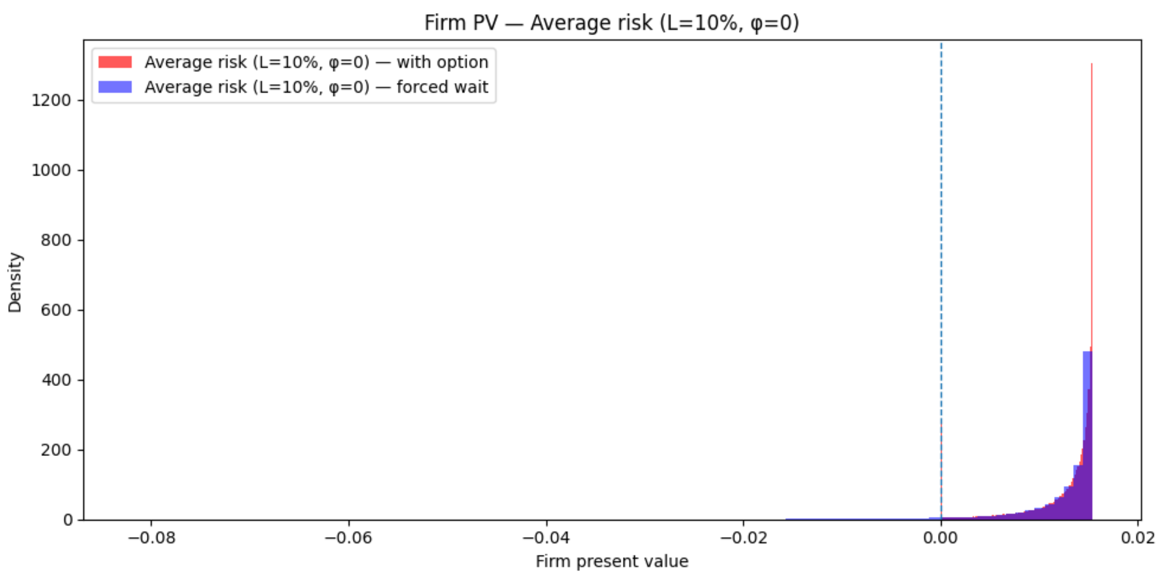


Figure 7: Firm present value distribution under rollover risk with average flow uncertainty.

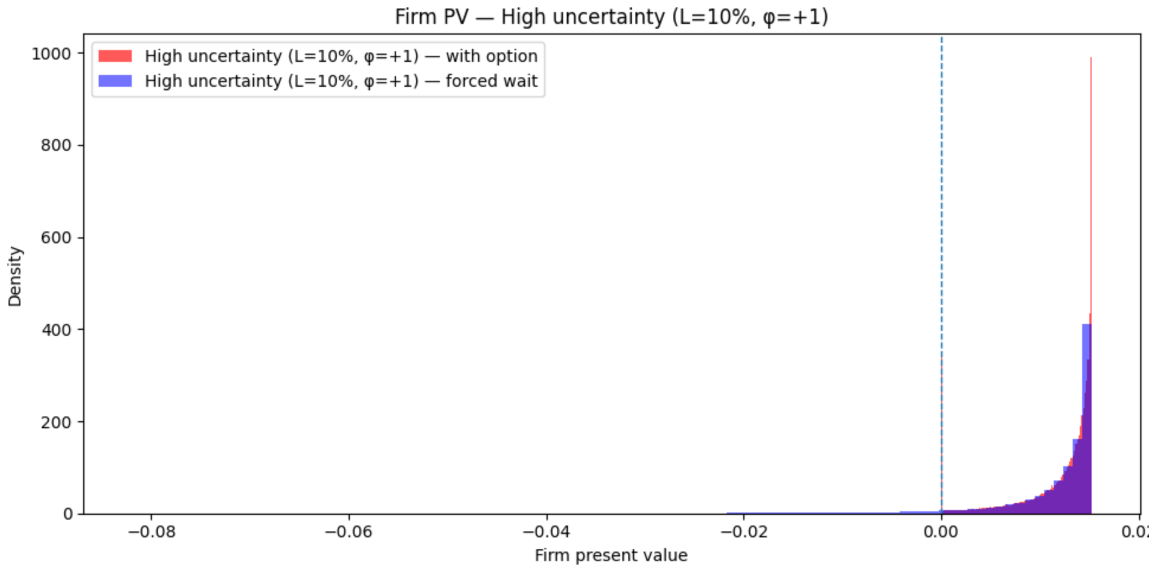


Figure 8: Firm present value distribution under rollover risk with high flow uncertainty.

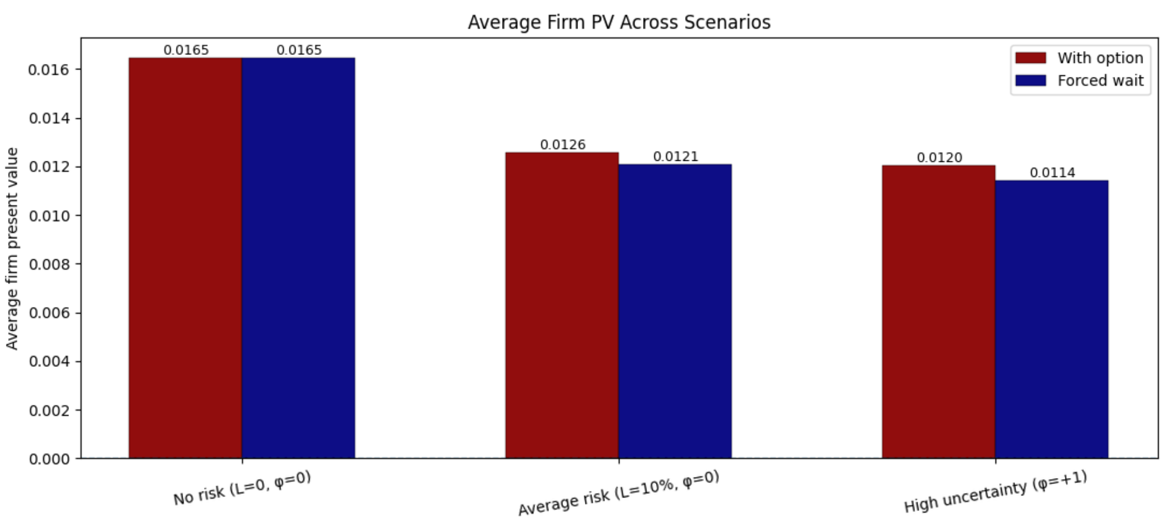


Figure 9: Average firm present value levels across scenarios.

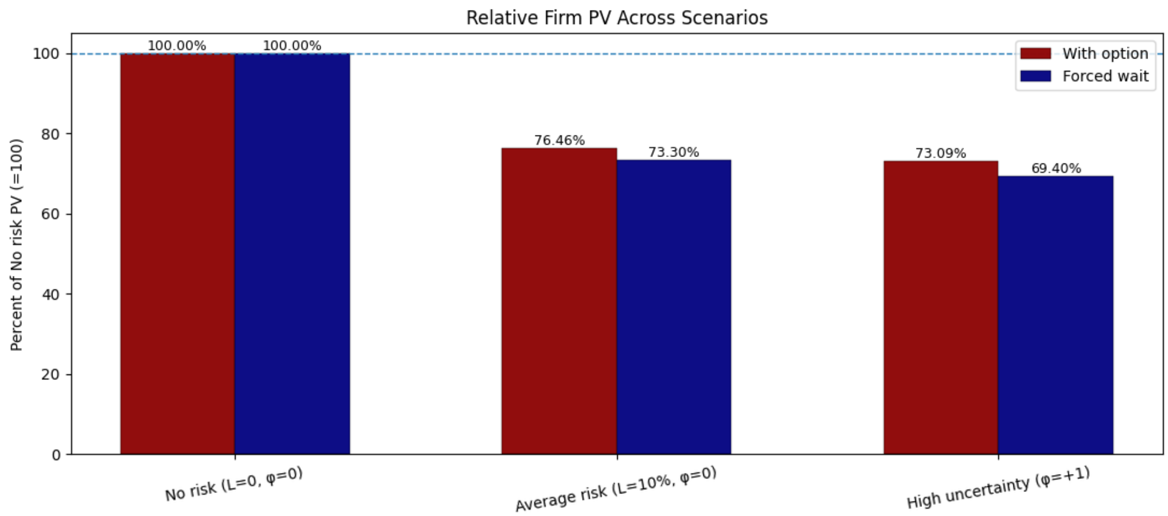


Figure 10: Average firm present value as a percentage of the no–risk baseline.

7 Conclusion

This paper provides a theoretical framework to understand corporate bond refinancing under capital supply uncertainty and empirically tests its predictions using bond-level data merged with mutual fund holdings. The results indicate that mutual funds are more than four times as likely to participate in the refinancing of bonds they previously held. Moreover, a one standard deviation increase in bondholder flow volatility is associated with a 0.9 percentage point increase in the probability of refinancing—equivalent to approximately 21% of the unconditional mean refinancing rate for high-yield bonds.

These findings provide new evidence on how capital supply conditions shape corporate refinancing decisions. In particular, uncertainty in investor flows appears to accelerate refinancing activity, prompting firms to refinance earlier than they would under more stable conditions. The calibrated model matches key empirical moments and shows that high capital supply uncertainty can reduce firms' interest savings by more than 3 percent. Moreover, in the absence of refinancing flexibility—such as callable provisions—firms' interest savings decline by an additional 3 percent under volatile credit supply conditions.

From a policy perspective, the results suggest that investor flow instability has meaningful implications for corporate bond market functioning. Monitoring the refinancing channel thus offers a complementary lens for the surveillance of non–bank financial institutions and their systemic role in credit supply. Future research may extend this analysis to examine how refinancing under uncertainty feeds into corporate investment and aggregate credit cycles.

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