Loan Distress Across CMBS Cohorts: A Lifecycle Approach

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Abstract

This paper examines how CMBS distress differs across issuance cohorts and across stages of the loan life cycle. Using three issuance cohorts—CMBS 1.0 (2008 or earlier), CMBS 2.0 (2010–2016), and CMBS 3.0 (2017 or later)—we first document large differences in bond loss rates and issuance composition across cohorts. We then study distress at two lifecycle stages. Early-stage distress is materially lower in post-crisis cohorts, while maturity defaults rise sharply in the post-pandemic period. Using hazard models of first transition to 60+ day delinquency, we find that loan-level financial variables remain important predictors across cohorts, while macro-financial conditions exhibit different and often stronger associations with delinquency in post-crisis cohorts. Using logistic models of maturity default for loans maturing in the post-pandemic period, we find that loan-level financial variables remain predictive, but the significance of property and time-specific factors suggest a growing role of refinancing frictions. Taken together, the evidence suggests that CMBS credit risk has shifted from early-stage cash flow risk toward late-stage refinancing risk in the modern cycle.

Section 1 – Introduction

A large share of the empirical literature on CMBS distress is shaped by the pre-crisis securitization era, when severe collateral deterioration translated into widespread delinquency, liquidation, and losses that extended far up the capital structure. That literature has established the importance of traditional underwriting variables, especially leverage and debt-service coverage, but it is less clear whether the same empirical relationships characterize the post-crisis CMBS market, where underwriting standards, deal composition, collateral mix, and maturity-resolution conditions differ materially.

This paper studies loan distress across three issuance cohorts: CMBS 1.0 (2008 or earlier), CMBS 2.0 (2010–2016), and CMBS 3.0 (2017 or later). The central question is how the timing and form of distress have changed across CMBS cohorts. We begin by documenting large differences in bond-loss experience and issuance composition across cohorts, showing that the crisis-era cohorts experienced substantially deeper and more widely distributed impairment, while the post-crisis market reflects both lower realized losses and a material shift in structure, including the growth of SASB issuance and meaningful changes in the property-type and loan-structure composition of conduit pools. These descriptive differences motivate a loan-level lifecycle analysis that distinguishes between early-stage delinquency and late-stage maturity resolution outcomes.

The empirical analysis proceeds in two stages. First, using a quarterly panel of conduit, single-property loans, we estimate Cox proportional hazard models of first transition to 60+ day delinquency. We find that traditional underwriting variables remain central predictors of early-stage distress, but their estimated magnitudes and the sensitivity of delinquency to macro-financial conditions shift across cohorts. Post-crisis cohorts enter with lower measured leverage and stronger debt-service capacity, though the interpretation of these improvements is complicated by both the measurement properties of appraisal-based LTV and by compositional shifts in the types of loans securitized into conduit pools across cohorts. Loan structural features, particularly interest-only terms, also exhibit economically meaningful and cohort-dependent associations with delinquency risk, with the prevalence and risk implications of full-term IO structures changing substantially between CMBS 1.0 and the post-crisis cohorts. Second, using a maturity-window sample of conduit loans scheduled to mature between 2021 and March 2025, we estimate logistic models of past-maturity default. The results show that unresolved maturity balances rise sharply after 2022 and are associated with both weaker loan fundamentals and broader refinancing conditions, with time effects and macro-financial variables becoming increasingly important in the later sample window.

A central finding of the paper is that CMBS distress no longer appears most prominently at the same stage of the loan life cycle across cohorts. In crisis-era cohorts, stress is more visible through delinquency and realized impairment. In the modern cycle, it is increasingly concentrated around refinancing bottlenecks and delayed maturity resolution. This lifecycle distinction helps reconcile lower post-crisis realized losses with the growing stock of unresolved loans in the recent maturity window.

The remainder of the paper proceeds as follows. Section 2 reviews the institutional and empirical literature. Section 3 describes the data source. Section 4 presents descriptive evidence on bond losses and issuance composition. Section 5 introduces the empirical design and documents empirical patterns.

Section 6 reports the early-stage delinquency hazard results. Section 7 reports the maturity-default analysis. Section 8 concludes.

Section 2 – Institutional Background and Related Literature

This paper draws on and contributes to several interconnected strands of literature: (i) the theoretical foundations of commercial mortgage default, (ii) empirical models of CMBS loan delinquency and termination, (iii) the role of securitization structure, servicing, and renegotiation frictions in shaping distress outcomes, (iv) underwriting quality and originator incentives, and (v) the evolving structure of the CMBS market across issuance cycles.

2.1 Theoretical Foundations of Commercial Mortgage Default

The theoretical literature on commercial mortgage default is rooted in the option-theoretic framework, which models the borrower's default decision as the exercise of a put option on the underlying property. Early contributions by Kau, Keenan, Muller, and Epperson (1987) and Titman and Torous (1989) adapt contingent-claims models to commercial mortgages, establishing that the borrower's equity position, determined jointly by property value and outstanding debt, is the primary driver of the default decision. In this framework, default is "rational" when the market value of the property falls sufficiently below the loan balance, net of transaction costs.

Vandell (1992) provides foundational empirical support for the equity theory of default using life-insurer portfolio data, confirming that the current loan-to-value ratio is the dominant predictor of commercial mortgage foreclosure but also documenting substantial "underexercise" of the default option, which he attributes to transaction costs and other frictions. Riddiough and Wyatt (1994) extend the theoretical framework to incorporate strategic workout and renegotiation, showing that the presence of renegotiation opportunities alters the borrower's optimal default boundary relative to a pure option-exercise model. These early contributions establish two points that remain central to the current paper: first, that leverage and property value are the core state variables governing default, and second, that institutional frictions, such as transaction costs, renegotiation incentives, and contractual structure, can materially alter the relationship between observable risk characteristics and realized distress outcomes.

2.2 Empirical Models of CMBS Loan Default and Termination

A substantial empirical literature estimates the determinants of commercial mortgage default using hazard and competing-risks frameworks. Vandell, Barnes, Hartzell, Kraft, and Wendt (1993) apply proportional hazards estimation to pooled commercial mortgage data, establishing the methodological template for subsequent CMBS loan-level studies. Archer, Elmer, Harrison, and Ling (2002) extend this approach to multifamily mortgage default, documenting that contemporaneous loan-to-value and debt-service-coverage ratios are among the strongest predictors of default incidence, a finding that has been widely replicated across property types and data sources.

Ciochetti, Deng, Lee, Shilling, and Yao (2003) estimate a proportional hazards model of commercial mortgage default that explicitly accounts for originator bias, finding that the identity and type of the originating institution affects default risk even after controlling for standard underwriting metrics. Ciochetti, Deng, and Yao (2002) model prepayment and default as competing risks, recognizing that the mortgage termination decision reflects the joint exercise of a default put and a prepayment call, with the relative importance of each varying over the loan lifecycle and across interest-rate environments.

Deng, Quigley, and Sanders (2005) analyze commercial mortgage terminations using CMBS data, providing further evidence that both property-type and regional economic conditions interact with underwriting variables in shaping default and prepayment outcomes. Seslen and Wheaton (2010) examine contemporaneous loan stress and termination risk in CMBS pools, finding that borrower behavior is not purely “ruthless” and that operational performance indicators such as DSCR provide incremental predictive content beyond leverage alone. An, Deng, and Gabriel (2011) document asymmetric information and adverse selection in CMBS pricing, showing that conduit-originated loans receive pricing advantages over portfolio loans despite perceptions of lower origination quality, a finding that highlights the role of information frictions in the securitization channel.

An, Deng, Nichols, and Sanders (2013) extend the default literature to incorporate local economic traits, finding that regional variation in employment, income, and property market conditions explains meaningful cross-sectional differences in CMBS loan default risk beyond what is captured by loan-level underwriting variables alone. These studies collectively establish that CMBS default is driven by an interaction of loan-level fundamentals (LTV, DSCR, occupancy), property-type effects, and macro-financial conditions, a set of relationships that the present paper re-examines across distinct issuance cohorts.

2.3 Securitization Structure, Servicing, and Renegotiation Frictions

A central institutional feature distinguishing securitized commercial mortgages from portfolio-held loans is the delegation of loss mitigation and workout decisions to special servicers operating under pooling and servicing agreements. This delegated-servicing structure creates potential agency conflicts that can affect both the timing and severity of realized distress outcomes.

Piskorski, Seru, and Vig (2010) provide influential evidence from the residential mortgage crisis that securitization reduces the probability of loan renegotiation relative to portfolio lending, consistent with the hypothesis that the securitization process introduces frictions that impede efficient modification. While their analysis focuses on residential mortgages, the underlying mechanism, that dispersed ownership of securitized debt creates coordination costs and misaligned incentives for renegotiation, applies with particular force to CMBS, where the special servicing framework and the advancing mechanism create distinct incentive structures for workout decisions.

Chen and Deng (2013) directly examine the role of special servicer workout strategy in CMBS, modeling the conditional default probability of loans that enter special servicing. Their analysis documents that the servicer’s initial workout decision, whether to pursue modification, forbearance, or foreclosure, significantly affects the subsequent probability of default, and that the two-stage nature of the CMBS distress process (initial delinquency followed by servicer-mediated resolution) is essential for understanding realized outcomes. This finding motivates the present paper's emphasis on distinguishing early-stage delinquency from late-stage resolution dynamics.

Ambrose, Sanders, and Yavas (2016) extend the analysis of servicer incentives by examining how the identity and affiliated relationships of master and special servicers affect CMBS default outcomes. They find that conflicts of interest arising from servicer affiliations can influence loss severity and resolution timing, reinforcing the importance of institutional design in mediating the link between loan-level fundamentals and realized credit losses. More recently, Flynn, Ghent, and Tchistyi (2024) develop a theoretical framework showing that policies encouraging renegotiation can paradoxically worsen borrower behavior by creating incentives for strategic delinquency among borrowers who would otherwise perform, calling it an "imitation game" in which the availability of modification induces moral hazard. This mechanism is relevant to interpreting distress dynamics in the modern CMBS cycle, where the prevalence of extensions and maturity-related modifications has increased substantially.

2.4 Underwriting Quality, Originator Incentives, and Moral Hazard

A parallel literature examines whether the securitization process itself degrades underwriting quality through weakened screening incentives. Keys, Mukherjee, Seru, and Vig (2010) provide seminal evidence from the residential market that securitization led to lax screening, documenting that loans with a marginally higher probability of being securitized experienced substantially higher default rates. While their analysis is specific to subprime residential mortgages, the underlying incentive structure, in which originators who do not retain credit risk may exert less screening effort, is directly relevant to the CMBS context.

Black, Chu, Cohen, and Nichols (2012) study differences in CMBS loan underwriting across originator types, finding that institutional characteristics of the originator (e.g., whether the lender is a balance-sheet bank, a conduit, or an investment bank) systematically predict post-securitization default risk even after controlling for observable loan characteristics. Their results are consistent with the view that originator incentives and organizational structure affect the quality of loans entering securitized pools.

Griffin and Priest (2023) provide the most recent and direct evidence on underwriting quality in the post-crisis CMBS market. They document that underwritten income on CMBS 2.0 loans is commonly overstated relative to actual property income, that the degree of overstatement varies persistently across originators, and that originator-level income overstatement is strongly predictive of subsequent loan distress. Notably, they find that risk-retention regulation, implemented after 2016 as a corrective to the incentive problems highlighted in the crisis-era literature, had no discernible effect on income overstatement practices. These findings are directly relevant to the present paper's cohort-based framework: they suggest that while observable underwriting metrics (LTV, DSCR) may have improved in post-crisis cohorts, unobservable dimensions of underwriting quality remain a potential source of latent credit risk.

Stanton and Wallace (2018) examine the CMBS market from a different angle, focusing on subordination levels and ratings inflation. Using Trepp data on conduit pools from 1995 to 2008, they demonstrate that declining subordination levels, driven by ratings inflation and regulatory-capital arbitrage, left senior tranches underprotected relative to the underlying risk of the collateral. Their analysis provides a structural explanation for the severity of CMBS 1.0 losses: it was not primarily that loan-level underwriting deteriorated dramatically (measured LTV and DSCR were relatively stable), but rather that the credit enhancement protecting rated bonds declined to levels that were insufficient given the tail risks of the collateral pool. This finding complements the descriptive evidence in the present paper showing that crisis-era bond losses penetrated far up the capital structure.

2.5 CMBS Market Evolution and Lifecycle Dynamics

More recent work has focused on structural changes in the post-crisis CMBS market. An, Cordell, and Smith (2023) provide a comprehensive analysis of CMBS market evolution, documenting the growing prominence of single-asset/single-borrower (SASB) transactions and the changing risk profile of the market across issuance cycles. Their analysis highlights that the modern CMBS market differs from the pre-crisis era not only in underwriting standards but also in the composition of what is being securitized, with SASB deals introducing different concentration, complexity, and liquidity dynamics relative to traditional conduit pools. These compositional shifts are directly relevant to the present paper's empirical design, which restricts the sample to conduit, single-property loans precisely to maintain comparability across cohorts.

Buschbom, Kau, Keenan, and Lyubimov (2021) examine borrower strategic behavior in the context of commercial mortgage modification, finding that delinquency and default decisions are influenced by the anticipated availability of modification. Their analysis documents that the modification process itself alters borrower incentives and that understanding default requires modeling the interaction between borrower behavior and servicer responses, a multi-stage view of distress that informs the present paper's distinction between early-stage delinquency and late-stage maturity resolution.

Taken together, the existing literature establishes several propositions that motivate the empirical analysis in this paper. First, leverage and cash-flow capacity are theoretically and empirically central to commercial mortgage default, but institutional frictions, such as securitization structure, servicing incentives, and renegotiation dynamics, mediate how these fundamentals translate into realized outcomes. Second, the quality of underwriting and the incentives of originators are important determinants of CMBS performance, and these incentive structures differ across issuance cohorts. Third, the CMBS market has undergone substantial structural change across the CMBS 1.0, 2.0, and 3.0 cohorts, including shifts in deal composition, regulatory environment, and the nature of the collateral being securitized. What remains less well understood, and what this paper directly addresses, is whether the estimated relationships between observable risk characteristics and distress outcomes are stable across these cohorts, and whether the locus of credit stress has shifted from early-stage delinquency toward late-stage maturity resolution in the modern cycle.

Section 3 – Data Source

The loan- and bond-level data used in this study are sourced from Trepp, Inc. Trepp is a long-standing provider of data, analytics, and technology solutions for the structured finance and commercial real estate markets, and its CMBS database is widely used by both practitioners and academic researchers because it offers standardized, longitudinal coverage of securitized collateral performance (e.g., balances, delinquency status, and collateral/financial reporting fields) at a frequency that supports event-time and panel-based empirical designs. In the CMBS context, Trepp's data are commonly regarded as an industry "gold standard" because the platform consolidates and harmonizes information at scale across deals and cohorts, enabling consistent comparisons of loan performance and deal outcomes over time.

Section 4 – Descriptive Evidence on Issuance Structure and Bond Loss Evolution

This section provides two complementary descriptive perspectives on the evolution of the U.S. private-label CMBS market. First, we document how issuance volume and deal composition have shifted over time, with particular attention to the changing mix between conduit pools and single-asset/single-borrower (SASB) transactions. Second, we summarize realized credit impairment through cumulative bond losses by cohort and original rating category as of 10/02/2025.

Throughout the descriptive and empirical analysis, we group issuance into three broad cohorts: CMBS 1.0 (2008 or earlier), CMBS 2.0 (2010–2016), and CMBS 3.0 (2017 or later). We treat 2009 as a transition year between crisis-era and post-crisis issuance and therefore exclude it from cohort-level comparisons.

Together, these descriptive facts establish (i) that the product being securitized has changed materially across issuance cycles and (ii) that realized losses differ sharply across cohorts and rating tiers, patterns that motivate a more formal loan-level analysis of CMBS credit risk.

4.1 Cumulative bond losses by cohort and rating

Table 1 reports cumulative bond losses by cohort and original rating category as of 10/02/2025. The table aggregates realized credit losses within a given cohort-rating cell (sum of losses divided by the sum of original securitized balances). Two clarifications are important for interpretation. First, the ratings are generalized and reflect the lowest rating at securitization for each bond (e.g., a bond originally rated A+/A is treated as A). Second, the table includes deals that have been paid off or retired, so the loss measure is intended to reflect "to-date realized impairment" relative to the original issuance base rather than losses on a remaining outstanding subset.

The results highlight a pronounced difference between crisis-era cohorts (CMBS 1.0) and post-crisis cohorts (CMBS 2.0/3.0), with three stylized facts:

1. Losses in the mid-2000s cohorts are severe and extend far up the capital structure. For the 2006–2008 cohorts, cumulative losses are extremely large in the subordinated categories and remain substantial even for investment-grade bonds. By 2008, the table indicates near-complete impairment for BB and below (100% for BB, B, and the "na" category), while A and AA also exhibit

very large realized losses (81.2% and 62.5%, respectively). Even AAA bonds show non-trivial cumulative losses in 2008 (4.5%), underscoring how extreme stress can overwhelm subordination when collateral performance deteriorates broadly and recovery values are weak. These cohort patterns align with the broader theme in the literature that CMBS 1.0 performance reflected a combination of cycle severity, underwriting weaknesses, and structural features that amplified losses under stress (Stanton and Wallace, 2018).

2. Post-crisis cohorts show substantially lower realized losses in investment-grade categories, even for cohorts that are now seasoned. In contrast to the crisis-era loss surface, CMBS 2.0 cohorts exhibit minimal cumulative losses in the senior and mezzanine investment-grade categories. For example, 2013–2016 cohorts show BBB losses in low single digits (and often near zero), while A/AA/AAA losses are generally close to zero. This is especially informative for the early post-crisis cohorts (2010–2014), which, given typical CMBS loan terms, have had enough time to season and, in many cases, pass through maturity and resolution windows where losses would be realized. The performance contrast with 2006–2008 is therefore not driven solely by lack of seasoning; rather, it reflects materially different realized credit impairment outcomes across cohorts.

3. Subordinate and unrated categories continue to bear meaningful losses in some post-crisis cohorts, but at magnitudes far below the crisis-era experience. Although CMBS 2.0 and 3.0 generally show improved outcomes, the table indicates that loss incidence is not uniformly negligible across all rating categories. Several post-crisis cohorts register noticeable losses in B and "na" categories (for example, select cohorts in the early-to-mid 2010s). This pattern is consistent with the basic economics of subordination: credit enhancement protects senior bonds in most states of the world, while lower-rated and unrated bonds are positioned to absorb losses when collateral underperforms. From an investor-outcomes perspective, the important distinction is that the distribution of realized impairment across ratings appears far more contained in the post-crisis market than in CMBS 1.0, where losses frequently migrated into categories that are typically viewed as protected by subordination.

4.2 Issuance cycles and the shift in deal composition

Figure 1 plots U.S. private-label CMBS issuance from 2000 through 2024, decomposed into conduit, SASB, and large-loan segments. Two features stand out:

First, the pre-crisis expansion was overwhelmingly conduit-driven. Issuance rises steadily in the early 2000s and culminates in the mid-2000s boom, peaking in 2007 at well above $200 billion. The composition of that peak is dominated by conduit pools, consistent with a market structure in which diversified multi-borrower collateral was the core product being securitized. Issuance then collapses sharply in 2008 and remains near zero in 2009, underscoring the extent to which the CMBS market contraction was both sudden and severe.

Second, the post-crisis recovery occurs alongside a meaningful compositional reallocation toward SASB. Beginning in the early 2010s, total issuance returns to economically meaningful levels, but the market no longer resembles the mid-2000s conduit-dominated structure. SASB issuance becomes a persistent and sometimes dominant component of annual totals, with especially prominent SASB volumes in the late-2010s and early-2020s (including a notable spike in 2021). Conduit issuance remains active throughout the post-crisis era, but it no longer accounts for the vast majority of total issuance in many recent years. Recent work emphasizing “market evolution and emerging risks” in CMBS is closely aligned with these descriptive patterns, particularly the growing relevance of SASB in the modern era (An, Cordell, and Smith, 2023).

4.3 Motivation for lifecycle focus

Ultimately, realized bond losses are a downstream outcome that combine several distinct components of CMBS credit risk: the likelihood that distress occurs, the point in the loan life cycle at which it emerges, the probability that troubled loans cure versus transition into liquidation, and the severity of loss conditional on resolution. In addition, realized losses are inherently lagged because liquidation and loss recognition often occur well after the initial onset of delinquency. As a result, bond-loss comparisons are highly informative about ultimate impairment, but they are less informative about the timing of distress emergence and the underwriting-related characteristics associated with that transition.

Taken together, the descriptive evidence in this section also suggests that simple aggregate comparisons across issuance cohorts can be confounded by structural market evolution. The shift in issuance composition toward SASB and large-loan transactions means that the underlying product being securitized differs materially across cycles. These composition effects matter for interpreting both unconditional loss comparisons and broader conclusions about how CMBS credit risk has evolved over time.

These limitations motivate a move from bond-level descriptive outcomes to loan-level empirical analysis. A loan-level framework allows us to isolate when distress first appears, distinguish early delinquency from later maturity-related resolution frictions, and evaluate whether the predictive role of observable underwriting variables differs across CMBS issuance cohorts. The next section therefore turns to the data construction and empirical design used to study these lifecycle stages more directly.

Section 5 – Data and Empirical Design

5.1 Empirical Design Overview

Our empirical design studies CMBS credit risk through a loan lifecycle lens, separating distress into two empirically distinct stages: early-stage delinquency and late-stage maturity outcomes. Using loan-level data from the Trepp CMBS database, the analysis first documents descriptive patterns in each stage—quarterly delinquency incidence across issuance cohorts and the recent rise in unresolved post-maturity balances—before turning to formal regression analysis.

The first empirical setting uses a quarterly loan-level panel to study the initial emergence of distress through a loan's first transition to 60+ day delinquency. This stage captures when loans first become troubled and allows the paper to evaluate whether the relationship between observable underwriting variables and early distress differs across CMBS 1.0, 2.0, and 3.0. We formalize this stage using Cox proportional hazards models, which are well suited to modeling the timing of first delinquency events.

The second empirical setting focuses on maturity-period outcomes using a sample of conduit loans scheduled to mature between January 2021 and March 2025. This stage captures whether loans remain unresolved beyond their scheduled maturity date in the recent refinancing environment. After documenting the descriptive rise in unresolved maturity balances, we estimate logistic models of past-maturity default to evaluate how loan fundamentals and common refinancing conditions relate to delayed resolution.

Taken together, these two empirical settings provide a roadmap for evaluating how CMBS distress differs not only across issuance cohorts, but also across stages of the loan life cycle.

5.2 Sample Restrictions

Our empirical setting is constructed for conduit CMBS loans backed by a single property. This restriction is intentionally conservative and is designed to produce the cleanest mapping between underwriting-related covariates and subsequent distress outcomes.

The reason for restricting the sample to conduit deals is because these deals are generally composed of many loans securitized into a tranched capital structure, and the associated loan-level performance reporting tends to be comparatively standardized across transactions. In contrast, single-asset/single-borrower (SASB) transactions often feature complex, deal-specific loan structures that can complicate empirical measurement of "loan performance" in ways that are well understood by market participants. Two issues are particularly important for academic work:

Multi-note and split-loan structures can bias observed performance statistics. Many SASB financings use multi-note stacks (e.g., A/B notes, pari passu notes, companion notes, and other split components) where the "loan" that appears in a dataset may correspond to only a portion of the full capital stack or may reflect reporting that is not directly comparable across deals. If the research inadvertently analyzes only one note or one reporting slice, measured delinquency, leverage, or payoff/refinance outcomes may not reflect the borrower's true capital structure or the full exposure relevant to credit risk.

Extension options and bespoke contractual features complicate maturity and distress timing. SASB loans frequently embed extension options and other structural features that alter the timing of "effective maturity," the interpretation of balloon risk, and the path through which distress is recognized in performance reporting. These features can introduce non-comparability in event timing and censoring, which is especially consequential in hazard settings where accurate event dates and exposure windows are central to inference.

In addition to the conduit restriction, we also limit the sample to single-property loans. Restricting to loans backed by a single property improves interpretability. When collateral spans multiple properties or includes portfolio/aggregate reporting, property-level cash-flow and valuation signals (e.g., DSCR, occupancy, appraisal-based LTV) can reflect aggregation across heterogeneous assets. This aggregation can attenuate relationships between covariates and distress outcomes and can blur the underwriting channel we seek to evaluate. Single-property loans provide a more direct link between observed property performance metrics and the probability of delinquency.

Overall, these sample restrictions are designed to minimize measurement error and structural non-comparability so that the results in Section 6 can be interpreted as evidence on how the relationship between underwriting characteristics and delinquency risk differs across CMBS issuance cohorts, rather than as artifacts of deal complexity or reporting idiosyncrasies.

5.3 Variable Definitions

Table 2 reports the full set of variable definitions used across the hazard and maturity analyses. The covariates are organized around three broad dimensions of CMBS credit risk.

The first dimension captures loan size and leverage, including the outstanding balance and current loan-to-value ratio. These variables proxy for borrower equity position, refinance feasibility, and exposure size. The second dimension captures property cash-flow strength and operating performance, including debt-service coverage and occupancy. These measures reflect the borrower's ability to service debt from current property income and are central indicators of near-term distress risk.

The third dimension captures loan pricing, term structure, interest-only features, and macro-financial conditions. In addition to the contract interest rate (loan_rate) and remaining term (remterm), the hazard specifications incorporate the original loan term through a set of categorical fixed effects. Specifically, we control for the length of the original term using indicator variables for loans with a term of less than 5 years, exactly 5 years, greater than 5 but less than 7 years, exactly 7 years, greater than 7 but less than 10 years, exactly 10 years, greater than 10 but less than 15 years, exactly 15 years, and greater than 15 years. While we report summary statistics for the original term in months (origterm) to characterize the distribution, the use of categorical fixed effects in the hazard model allows us to more explicitly test whether there are discrete differences in the delinquency hazard across standard term buckets—for example, whether 5-year and 10-year loans exhibit systematically different baseline risk profiles after controlling for other covariates.

We also include two variables capturing interest-only (IO) loan structure. The first is fulltermio, a binary indicator equal to one if a loan is interest-only for its entire term. Full-term IO loans never amortize, meaning the borrower faces the full original balance at maturity and the loan generates no forced equity buildup over its life. The second is currentlyio, a time-varying binary indicator equal to one if the loan is currently within its partial IO period. Partial IO loans begin with an interest-only phase before transitioning to amortization; during the IO period, the borrower makes lower payments and the loan balance does not decline. These variables are intended to capture the extent to which IO features alter the delinquency hazard, either through reduced payment burden during the IO period or through the higher leverage exposure that IO structures maintain relative to amortizing loans.

Macro-financial conditions are captured by the 10-year Treasury yield (tsy10yr), the 10-year minus 2-year Treasury spread (t10y2y), and the CBOE Volatility Index (vix). These variables are intended to capture both the direct financing-cost channel and the broader capital-market environment in which delinquency and maturity outcomes occur.

For the maturity specifications, we additionally incorporate variables tied more directly to refinancing feasibility, including debt yield, loan age, prior modification status, and monetary policy uncertainty. Together, the full set of variables allows the empirical design to distinguish between property-level operating weakness, balance-sheet leverage, loan structural features, and market-wide refinancing conditions as drivers of CMBS distress across lifecycle stages.

5.4 Early-Stage Delinquency

5.4.1 Dataset Construction

For each loan in the conduit, single-property sample, we construct a loan-quarter panel in which collateral, loan, and macro-financial conditions are observed at a quarterly frequency. The central outcome tracked in this portion of the data is the loan's first transition to 60+ days delinquent. Each loan is followed from its first observable quarter until the first delinquency event or until it exits the observable sample through payoff, liquidation/retirement, or the end of the sample window.

This panel structure is designed to preserve the timing of distress emergence, allowing loan fundamentals, property operating measures, and macro-financial variables to evolve over the life of the loan at the quarterly frequency. In addition to the time-varying covariates listed above, the Cox specifications include property-type fixed effects, securitization-year (cohort) fixed effects, and original-term fixed effects, which flexibly account for systematic differences in distress risk across property sectors, issuance environments, and contractual term structures. The resulting dataset provides a consistent loan-level view of early-stage distress dynamics across CMBS issuance cohorts.

5.4.2 Summary Statistics

To characterize the pooled conduit, single-property sample, Table 3 reports summary statistics using the first observed loan-quarter for each loan, pooled across CMBS 1.0, 2.0, and 3.0. Several features are worth highlighting.

The average log current balance is 15.45 (median 15.41), consistent with the right-skewed balance distribution typical of CMBS collateral pools. The mean current LTV is 66.36% (median 70.09%), indicating moderate leverage on average but substantial dispersion across loans. Measures of operating performance also suggest meaningful heterogeneity: the mean DSCR is 1.72 (median 1.55), implying that while many loans enter the panel with a debt-service buffer, a nontrivial portion begin with comparatively thinner coverage. Similarly, the mean occupancy rate of 93.56% (median 96.61%) is consistent with generally stabilized collateral at first observation.

The loan structural variables reveal important features of the sample. The average original term is 121 months (median 120), consistent with the predominance of 10-year balloon structures in the conduit market. The mean number of interest-only periods is 17 months (median 0), reflecting the fact that while many conduit loans are fully amortizing from origination, a subset carries IO terms of varying length. The full-term IO indicator (fulltermio) has a pooled mean of 9.3%, indicating that approximately one in ten loans in the sample makes interest-only payments for the entirety of the loan term.

The macro-financial variables also vary meaningfully across the sample period. The quarterly average 10-year Treasury yield is 4.29% (median 4.63%), the average 10y–2y spread is 0.76% (median 0.29%), and the average VIX is 20.09 (median 19.17). Together, these variables describe the range of financing and market environments represented in the pooled sample.

Finally, Table 5 reports the property-type composition of the pooled sample. Retail (31.62%) and multifamily (24.58%) represent the largest shares, followed by office (16.48%), other (18.43%), lodging (7.19%), and mixed-use (1.70%).

5.4.3 Descriptive Patterns

Table 3 also reports summary statistics separately for the CMBS 1.0, 2.0, and 3.0 cohorts, revealing several economically meaningful differences in observable loan and market characteristics across issuance eras.

The most important contrasts appear in leverage and debt-service capacity, the core underwriting dimensions. CMBS 1.0 loans enter the panel with the highest leverage, with a mean (median) current LTV of 67.66% (71.60%). Leverage declines in CMBS 2.0 to 63.88% (67.40%) and falls further in CMBS 3.0 to 55.58% (61.70%). In parallel, DSCR rises monotonically across cohorts: 1.67 (1.50) in CMBS 1.0, 1.91 (1.79) in CMBS 2.0, and 2.00 (1.86) in CMBS 3.0. Taken together, these patterns suggest that later cohorts enter the observable panel with stronger measured underwriting profiles.

Loan pricing and the surrounding interest-rate environment also differ sharply across cohorts. CMBS 1.0 loans exhibit substantially higher contract rates, with a mean (median) loan rate of 6.65% (6.31%), compared with 4.82% (4.75%) in CMBS 2.0 and 4.55% (4.59%) in CMBS 3.0. This downward shift is mirrored in the 10-year Treasury environment, which averages 4.78%–4.74% in CMBS 1.0 versus approximately 2.22%–2.16% in CMBS 2.0 and 2.23%–2.26% in CMBS 3.0. These differences indicate that the cohorts are observed under materially different financing cohorts.

The interest-only structure of loans also varies substantially across cohorts, and this variation is one of the most pronounced compositional differences in the sample. In CMBS 1.0, the average number of IO periods is 14 months (median 0) and only 7.2% of loans are full-term IO. CMBS 2.0 is broadly similar, with a mean of 18 IO periods (median 0) and 7.3% full-term IO. In contrast, CMBS 3.0 exhibits a dramatic shift: the mean number of IO periods rises to 53 months (median 36) and 37.7% of loans are full-term IO. This pattern is consistent with the broader market trend toward more aggressive IO structures in post-2017 conduit issuance and is particularly relevant for understanding both delinquency risk and maturity outcomes, since full-term IO loans maintain higher leverage throughout their life and face the full original balance at balloon.

The original loan term also shows modest variation across cohorts. The mean original term is 123 months (median 120) in CMBS 1.0, 114 months (median 120) in CMBS 2.0, and 117 months (median 120) in CMBS 3.0. While the 10-year (120-month) term remains the modal structure across all cohorts, the somewhat longer average in CMBS 1.0 and the somewhat shorter average in CMBS 2.0 likely reflect differences in the mix of non-standard terms (e.g., 5-year and 7-year loans) across issuance cohorts.

The property-type composition of the conduit sample also shifts meaningfully across cohorts. As reported in Table 5, retail and multifamily together account for nearly 60% of CMBS 1.0 loans (32.2% and 26.9%, respectively), but their combined share falls to approximately 38% in CMBS 3.0 (25.0% and 13.4%). The decline in multifamily is particularly pronounced, as its share is cut roughly in half between CMBS 1.0 and the post-crisis cohorts. Conversely, the "Other" category, which includes property types such as industrial, self-storage, manufactured housing, and healthcare facilities, rises from 17.2% of CMBS 1.0 to 29.9% of CMBS 3.0, making it the single largest compositional shift in the table. Lodging also increases from 5.7% to 11.2%, while mixed-use rises from 0.9% to 6.2%. Office remains relatively stable across cohorts at 13–17%. These shifts indicate that the conduit collateral pool in the modern cohort is substantially more diversified across non-traditional property types than in the pre-crisis market, a pattern that is relevant both for interpreting the property-type fixed effects in the hazard models and for understanding how sector-specific risk exposures differ across cohorts.

The decline in multifamily representation across cohorts warrants particular attention because it may reflect not only demand-side shifts in securitization preferences but also a supply-side reallocation of credit across lending channels. As post-crisis regulation tightened conduit underwriting standards, and particularly after risk-retention rules took effect in late 2016, a growing share of commercial real estate credit, especially for higher-risk development, transitional, and lease-up assets, has migrated to private credit vehicles, debt funds, and other non-bank lenders that operate outside the transparency and reporting requirements of the public securitization market. This channel substitution is likely most pronounced in property types and markets where development risk is elevated, such as the multifamily sector in high-growth Sunbelt metros that experienced significant construction pipelines during the CMBS 3.0 cohort. To the extent that riskier multifamily credits have been disproportionately absorbed by private and opaque capital sources rather than securitized into conduit pools, the CMBS 3.0 conduit sample may reflect a degree of favorable selection: the loans that enter the observable securitized universe may systematically exclude the segment of multifamily lending most exposed to lease-up, absorption, and overbuilding risk. This compositional channel has implications for interpreting the improved early-stage delinquency outcomes documented in Section 6 for the CMBS 3.0 cohort, as part of the improvement may reflect what is being securitized rather than, or in addition to, how it is being underwritten. Moreover, private credit-financed development activity can create supply-side risk for stabilized CMBS collateral through competitive pressure on rents and occupancy in the same submarkets, a transmission channel that is not captured by the macro-financial controls used in the hazard and maturity specifications.

The broader market-risk backdrop also varies across cohorts. The VIX proxy indicates that CMBS 1.0 loans are observed in a higher-uncertainty environment on average (20.81, median 21.53) than CMBS 2.0 (16.29, median 14.84) and CMBS 3.0 (18.58, median 16.47). The yield-curve slope further differentiates the post-crisis subsamples: CMBS 2.0 coincides with a notably steeper curve (1.72%, median 1.55%), while CMBS 3.0 is associated with a flatter curve on average (0.52%, median 0.44%). These differences underscore that the cohorts differ not only in observable underwriting characteristics, but also in the broader capital-market environments in which loan performance unfolds.

5.5 Maturity Outcomes

5.5.1 Dataset Construction

The maturity-distress sample uses Trepp's monthly loan-level CMBS data for conduit loans scheduled to mature between January 2021 and March 2025. The central outcome tracked in this portion of the data is whether a loan goes past its scheduled maturity date, defined as remaining unresolved beyond maturity, including loans that are formally extended or remain outstanding without payoff or liquidation.

For each loan, we observe collateral fundamentals such as DSCR, debt yield, and occupancy, along with structural features including loan size, age, and prior modification status. These variables are intended to capture both near-term operating strength and broader refinancing viability at the end of the loan life cycle.

All variables are measured one year prior to scheduled maturity. Measuring too close to maturity risks conditioning on information already affected by imminent resolution decisions, while measuring too far in advance weakens relevance for the maturity event itself. The one-year lookback provides a balanced view of the information set likely available when refinancing and extension decisions begin.

5.5.2 Summary Statistics

Table 4 reports summary statistics for the maturity-distress sample, with all variables measured one year prior to scheduled maturity. Several features are worth highlighting.

The average debt-service coverage ratio at the one-year pre-maturity observation is 1.81 (median 1.69), indicating that loans approaching maturity generally continue to exhibit positive cash-flow coverage, though with meaningful cross-sectional dispersion. The average debt yield is 15.54% (median 12.31%), suggesting that many loans retain a nontrivial NOI-to-balance cushion entering the maturity window.

The average loan age at the pre-maturity observation is 9.81 years (median 10), consistent with the standard 10-year balloon structure common in conduit CMBS. The mean log current balance is 15.99 (median 15.87), broadly comparable to the size distribution observed in the early-stage hazard sample.

Approximately 18.85% of loans in the maturity sample go past their scheduled maturity date. This unconditional share indicates that nearly one in five loans in the modern maturity window experiences some form of delayed resolution. In addition, 12.02% of loans have experienced a prior modification by the one-year pre-maturity observation, indicating that a nontrivial subset enters the maturity window with an already altered contractual or performance history.

Overall, the maturity sample consists of loans that, on average, exhibit moderate cash-flow strength but meaningful dispersion in refinancing-related fundamentals and structural characteristics at the one-year pre-maturity mark.

5.5.3 Descriptive Patterns

Several clear patterns emerge in the maturity-distress sample. The most striking is the sharp rise in loans going past maturity after 2022. As shown in Figure 2, unresolved balances grow rapidly over the sample window, with unresolved volumes increasing more quickly than formal extensions beginning in 2024. By mid-2025, more than $23 billion in CMBS loans remained past maturity without payoff, liquidation, or extension.

In recent years, commercial real estate credit markets have experienced a meaningful rise in loans that fail to resolve at their scheduled maturity date. Under normal balloon structures, loans typically refinance, pay off, or liquidate on time. Since 2022, however, an increasing share has lingered beyond term, either through formal extension or by remaining unresolved. While this pattern is often associated with the practitioner “extend-and-pretend” narrative, we use the term maturity drag as a descriptive label for this broader phenomenon of delayed maturity resolution under refinancing constraints, valuation uncertainty, and coordination frictions.

A second pattern is the shift in maturity drag across property types over time. Figure 3 shows that delays were initially more pronounced in retail during the early post-pandemic adjustment, while later resolution delays become increasingly concentrated in office properties. Figure 4, which normalizes by maturity volumes, shows that the share of office loans going past maturity rises meaningfully from 2022 through 2024, while retail and lodging moderate after earlier spikes.

Third, maturity-related distress accounts for a growing share of aggregate CMBS delinquency. Figure 5 shows that loans near or beyond maturity represent a substantially larger portion of delinquent balances by mid-2025 than in early 2022. By mid-2025, out of approximately $42 billion in delinquent CMBS loans, roughly $13 billion were already past maturity and another $18 billion were scheduled to mature within six months. These patterns suggest that maturity-related stress has become an increasingly important component of aggregate CMBS delinquency dynamics.

Finally, resolution outcomes differ across maturity cohorts. Figure 6 indicates that most loans maturing in 2023 had either paid off or extended by mid-2025, whereas loans maturing in 2024 remained disproportionately unresolved, with liquidations limited. This contrast suggests that common time effects and sector-specific refinancing conditions may play an important role in shaping maturity outcomes beyond loan-level fundamentals alone.

Section 6 – Determinants of Early-Stage Delinquency

This section focuses on the early stage of the loan life cycle—the transition into delinquency—allowing us to evaluate how underwriting and macro-financial signals relate to the initial emergence of distress across CMBS cohorts. The analysis reports loan-level event-time estimates of distress in conduit CMBS.

6.1 Methodology

Using the quarterly loan panel described in Section 5, we estimate Cox proportional hazards models in which the event of interest is a loan's first transition to 60+ days delinquent. Covariates include time-varying measures of leverage, cash-flow capacity, loan pricing, remaining term, property operating performance, interest-only structure, and contemporaneous macro-financial conditions. All specifications include fixed effects for property type, securitization year, and the original loan term.

We first estimate the model on the pooled conduit sample and then re-estimate it separately for the CMBS 1.0, 2.0, and 3.0 cohorts. This structure allows the relationship between observable underwriting characteristics and early-stage distress to vary across issuance cohorts. The inclusion of original-term fixed effects controls flexibly for systematic differences in baseline delinquency risk across term structures (e.g., 5-year versus 10-year loans), while the remaining-term variable captures the time-varying effect of approaching maturity within any given term bucket.

6.2 Pooled Sample Results

Table 6 reports hazard ratios for the pooled sample and then separately for CMBS 1.0, CMBS 2.0, and CMBS 3.0, allowing the mapping from underwriting and market conditions to delinquency risk to differ across issuance cohorts.

In the pooled estimation, delinquency risk is strongly related to the canonical underwriting variables. Leverage is positively associated with distress: the hazard ratio for curltv is 1.0001 and is highly statistically significant. While the per-unit hazard ratio is close to one mechanically because LTV is measured in percentage points, the direction and precision indicate that higher leverage is associated with a higher likelihood of becoming 60+ days delinquent, holding other characteristics constant.

Cash-flow capacity (DSCR) has the largest protective association in the pooled model. The hazard ratio is 0.407, implying that a one-unit increase in DSCR corresponds to an approximate 59% reduction in the delinquency hazard (1 − 0.407), underscoring the central role of current debt-service capacity in predicting near-term distress.

Other loan and property controls behave as expected. Occupancy (occrate) is strongly protective (hazard ratio 0.972), indicating that stronger operating performance is associated with lower delinquency risk. Remaining term (remterm) has a hazard ratio of 0.990 and is statistically significant in the pooled model, consistent with the idea that loans closer to their effective maturity or balloon date face higher stress and are more likely to enter delinquency. Loan size (ln_curbal) exhibits a hazard ratio of 1.229, suggesting that larger-balance loans have higher delinquency hazards after conditioning on leverage, DSCR, and other controls—potentially reflecting differences in sponsor behavior, collateral type mix, or the concentration of exposure within a single asset.

Loan pricing and macro-financial variables are also important. The loan interest rate (loan_rate) is positively associated with delinquency risk (hazard ratio 1.433), consistent with higher contractual debt costs being associated with a higher hazard of distress. The pooled macro variables indicate that delinquency risk is related to the broader market environment: the 10-year Treasury level (tsy10yr) has a hazard ratio of 0.740, while the term spread (t10y2y, hazard ratio 1.418) and market volatility (vix, hazard ratio 1.019) have hazard ratios above one. These macro relationships should be interpreted as conditional correlations: they reflect how distress covaries with the interest-rate and risk environment within the sample period, net of loan and property fundamentals.

The interest-only variables provide new evidence on how IO loan structure relates to delinquency risk. In the pooled model, the full-term IO indicator (fulltermio) has a hazard ratio of 0.740 and is highly significant ($z = -5.11$), indicating that full-term IO loans are associated with a lower delinquency hazard in the pooled sample after controlling for other covariates. This result may appear counterintuitive, since full-term IO loans maintain higher leverage throughout their life. However, in a specification that already conditions on current LTV, DSCR, and occupancy, the fulltermio coefficient captures the residual association between IO structure and delinquency beyond these fundamentals. One interpretation is that full-term IO loans, by avoiding the payment step-up associated with the transition from IO to amortization, face a lower risk of cash-flow-driven delinquency during the loan term itself. The currently-IO indicator (currentlyio) is not statistically significant in the pooled model (hazard ratio 1.045, $z = 0.91$), suggesting that, on average, being within a partial IO period does not have a strong independent association with delinquency risk in the full sample.

6.3 Cohort-by-Cohort Comparisons

Estimating the model separately by issuance cohort highlights several differences that are useful for interpreting how underwriting signals evolve across cohorts.

The first difference is that leverage becomes more predictive in the post-crisis cohorts. The leverage effect is economically modest per percentage point but becomes much stronger in CMBS 2.0 and CMBS 3.0 than in CMBS 1.0. In CMBS 2.0 and CMBS 3.0, the hazard ratios for curltv are 1.0087 and 1.0103, respectively, compared with approximately 1.0001 in CMBS 1.0. This implies that, conditional on the rest of the model, a 10-point increase in LTV corresponds to roughly a 9–10% higher delinquency hazard in the post-crisis cohorts, versus a near-flat relationship in CMBS 1.0. One interpretation is that post-crisis conduit performance may be more tightly “disciplined” by measured leverage, whereas CMBS 1.0 distress was driven by broader tail risks and structural vulnerabilities that swamped the cross-sectional signal in LTV.

An alternative and potentially complementary interpretation relates to how current LTV is measured in practice. For most performing CMBS loans, the appraised value underlying the LTV calculation is the value assigned at origination; properties are not routinely reappraised during the loan term. Reappraisals are typically triggered only after a loan enters special servicing, often following 60+ day delinquency, 90+

day delinquency, or other credit events such as the inability to refinance at maturity. As a result, curltv for performing loans reflects origination-era leverage that declines only mechanically through scheduled amortization (or not at all for full-term IO loans), rather than a contemporaneous measure of the borrower's true equity position. In the CMBS 1.0 cohort, where the crisis produced severe and broadly distributed property-value declines, the actual equity positions of many borrowers likely deteriorated well beyond what the reported LTV would suggest, compressing the cross-sectional informativeness of the variable: loans with very different reported LTVs may have had similarly impaired true equity positions by the time distress emerged. Indexing the sample to include only loans that eventually received a reappraisal would introduce selection bias, since reappraisal is itself a consequence of distress. In the post-crisis cohorts, where property-value paths have been less uniformly adverse, the origination-era LTV may retain more cross-sectional discriminating power, as the gap between reported and true equity is likely smaller and less systematically correlated with distress. Additionally, the extreme uncertainty surrounding property values during the 2007–2009 period increases the option value of delaying default, potentially weakening the contemporaneous mapping between observed leverage and the timing of delinquency in the CMBS 1.0 sample. We cannot directly test these channels in the current design, but the distinction between the informativeness of reported LTV under different valuation regimes is important for interpreting the cross-cohort shift in the estimated leverage effect.

The second difference is that DSCR remains strongly protective, but the magnitude attenuates in later cohorts. DSCR is strongly protective in every cohort, but the hazard ratios move upward across cohorts: 0.349 (CMBS 1.0), 0.537 (CMBS 2.0), and 0.653 (CMBS 3.0). Mechanically, this indicates that DSCR still matters substantially, but its estimated marginal association with delinquency risk is largest in CMBS 1.0 and somewhat smaller in CMBS 2.0/3.0. This attenuation is consistent with later cohorts having higher baseline DSCR and lower leverage at entry (as shown in the summary statistics), which can compress the variation in DSCR and reduce the incremental predictive content of an additional unit of coverage. It may also reflect that distress in the modern cohorts is more strongly mediated by other channels (e.g., refinance constraints and market-wide risk conditions), which are explicitly controlled for in the hazard framework.

The third difference is that contract rates are more strongly related to delinquency risk in CMBS 2.0 and 3.0. The loan interest rate shows a striking cohort pattern: the hazard ratio rises from 1.359 (CMBS 1.0) to 1.782 (CMBS 2.0) and 1.702 (CMBS 3.0). This suggests that, in the post-crisis cohorts, higher contractual borrowing costs are more tightly linked to the probability of becoming 60+ days delinquent. Interpreting this finding alongside the macro controls, the results are consistent with a world where the financing-cost channel—the sensitivity of distress to debt costs and the pricing of risk—becomes more central in explaining variation in delinquency across loans in the modern cohort.

The fourth major difference is that the interest-only variables exhibit strikingly different patterns across cohorts. In CMBS 1.0, full-term IO loans have a significantly lower delinquency hazard (hazard ratio 0.693, $z = -6.42$), and loans currently within their partial IO period have a modestly elevated hazard (1.125, $z = 2.31$). In CMBS 2.0, however, the pattern reverses dramatically: full-term IO loans exhibit a much higher hazard (2.545, $z = 3.36$), while loans currently in their partial IO period exhibit a much lower hazard (0.451, $z = -3.16$). In CMBS 3.0, the currently-IO indicator is also protective (0.665, $z = -2.10$), while the full-term IO indicator is positive but not statistically significant (1.346, $z = 1.46$).

These cohort-level IO patterns are among the most economically interesting results in the hazard analysis. In CMBS 1.0, IO structures were less prevalent and the protective pooled association of fulltermio may reflect selection: full-term IO loans in the pre-crisis cohort may have been associated with stronger sponsors or higher-quality collateral that also predicted lower delinquency risk through channels not fully captured by the model's other covariates. In the post-crisis cohorts, by contrast, full-term IO structures became far more common (37.7% of CMBS 3.0 loans) and were adopted across a broader cross-section of borrowers and collateral types. The elevated hazard for full-term IO in CMBS 2.0 is consistent with the possibility that these loans, by maintaining higher leverage throughout their term and lacking forced amortization, may be more vulnerable to distress when property-level or market conditions deteriorate—a risk that is partially masked in the pooled sample by the protective CMBS 1.0 selection effect.

The protective effect of currentlyio in CMBS 2.0 and 3.0 has a more straightforward interpretation: loans that are currently in their IO period face a lower debt-service burden (no principal payment) and therefore a lower probability of cash-flow-driven delinquency, conditional on the other covariates in the model. This effect is consistent with the IO period providing a mechanical payment buffer that reduces near-term delinquency risk, even if the loan's longer-term risk profile (including the payment step-up at IO expiration) may ultimately be higher.

The fifth and final major difference is that macro-financial variables reveal different "cycle signatures" across cohorts. The 10-year Treasury level is weakly protective in CMBS 1.0 (hazard ratio 0.933) but strongly protective in CMBS 2.0 (0.324) and CMBS 3.0 (0.173). The term spread (10y–2y) flips sign across cohorts: it is associated with higher delinquency risk in CMBS 1.0 (hazard ratio 1.580) but is strongly protective in CMBS 2.0 (0.331) and CMBS 3.0 (0.214). In the post-crisis subsamples, a flatter or inverted curve (lower spread) is associated with higher delinquency hazard, consistent with the yield-curve slope capturing downturn risk and tightening financial conditions. The opposite sign in CMBS 1.0 suggests that the curve's role as a "state variable" is not stable across cohorts—potentially because the pre-crisis period includes a prolonged expansion and then an extreme crisis episode, which can change how the curve comoves with delinquency within-sample.

VIX is positive and statistically significant in all cohorts, and its magnitude rises in CMBS 2.0 (1.047) and CMBS 3.0 (1.070) relative to CMBS 1.0 (1.013). This indicates that heightened market uncertainty is associated with an increased hazard of delinquency, and that this association is particularly pronounced in the modern cohorts.

Remaining term (remterm), which was strongly significant in the pooled model, loses statistical significance in the CMBS 2.0 and 3.0 subsamples (hazard ratios 0.984, $z = -1.28$ and 1.045, $z = 1.54$, respectively), while it retains its protective association in CMBS 1.0 (0.989, $z = -6.63$). This loss of significance in the later cohorts may reflect the inclusion of original-term fixed effects, which absorb much of the cross-sectional variation in term structure. Within a given term bucket, the residual time-to-maturity effect appears less informative in the post-crisis cohorts than in CMBS 1.0, where the broader range of seasoning and macro exposures may generate more within-bucket variation in maturity proximity.

Finally, Table 6 highlights a key empirical constraint that informs interpretation: the number of observed delinquency events falls sharply across cohorts, with 9,369 events in CMBS 1.0, 1,156 in CMBS 2.0, and 391 in CMBS 3.0. While the CMBS 2.0 and 3.0 estimates remain highly statistically informative for many covariates, the smaller number of events in later cohorts naturally implies less precision for marginal effects near conventional significance thresholds (e.g., the curltv estimate in CMBS 3.0, which has a hazard ratio of 1.0103 but a p-value of 0.073).

6.4 Discussion

Overall, the cohort-specific hazard models provide several takeaways that motivate the remainder of the paper. First, the direction of key underwriting fundamentals—lower leverage, higher DSCR, and higher occupancy reducing distress risk—remains stable across cohorts, reinforcing their role as core predictors of delinquency. Second, the strength of these relationships and the way macro-financial conditions map into delinquency risk differ meaningfully across CMBS 1.0, 2.0, and 3.0. These shifts are consistent with the descriptive evidence that later cohorts enter with different underwriting profiles and experience markedly improved realized loss outcomes.

Third, interest-only loan structure exhibits economically meaningful and cohort-dependent associations with delinquency risk. The reversal of the full-term IO effect from protective in CMBS 1.0 to strongly positive in CMBS 2.0 is consistent with the broadening adoption of IO structures across the post-crisis market and suggests that the delinquency implications of IO are not uniform but depend on the composition and risk characteristics of the borrower pool using these structures in each cohort. The protective effect of being currently within a partial IO period in the post-crisis cohorts is consistent with the mechanical payment-buffer channel, whereby the lower debt-service burden during the IO phase reduces near-term cash-flow-driven delinquency risk.

Across specifications, three broad themes emerge. First, underwriting and property performance metrics—particularly LTV, DSCR, and occupancy—are strongly associated with delinquency risk in economically intuitive directions. Second, the strength of these associations changes across cohorts, consistent with meaningful differences in the risk profile of conduit collateral across cohorts. Third, macro-financial variables are statistically significant and display patterns consistent with the notion that delinquency risk is not purely idiosyncratic: it co-moves with the broader interest-rate and risk environment, and those relationships are not identical across cohorts. In the next section, we leverage these results as a foundation for the maturity-default analysis, which isolates refinance and balloon-risk outcomes in the 2021–March 2025 maturity window.

Section 7 – Determinants of Maturity Default

Section 6 shows that the relationship between observable loan-level and macroeconomic characteristics and early-stage delinquency risk differs across CMBS issuance cohorts, while the number of observed delinquency events declines sharply in the post-crisis cohorts. This raises the next lifecycle question for the modern market: as the likelihood of mid-life delinquency has declined and loans increasingly survive to maturity, what credit risk factors feature most prominently at the maturity margin? To address this question, we turn to a recent maturity-window sample and examine how loan fundamentals and the refinancing environment affect the risk of default at maturity.

7.1 Methodology

To quantify the determinants of maturity default, we estimate a logistic regression model of the probability that a loan goes past its scheduled maturity date:

$$Pr(PastMaturity_i = 1) = \Lambda(\alpha + X_i'\beta + \varepsilon_i)$$

The dependent variable equals one if the loan remains unresolved beyond its scheduled maturity date. The covariate vector X_i includes loan performance measures observed one year prior to maturity, including DSCR, debt yield, and occupancy; loan characteristics such as size, prior modification status, loan rate, and loan age at maturity; property-type indicators; and macro-financial controls. Measuring covariates one year prior to maturity avoids conditioning on information already affected by imminent resolution while preserving predictive relevance for the maturity event.

We estimate complementary specifications. The baseline specification includes loan-level fundamentals and property controls. The second adds maturity-year fixed effects to capture common time variation in the maturity-resolution environment. The third replaces these year indicators with macro-financial variables, including the 10-year Treasury yield and the Monetary Policy Uncertainty (MPU) index, to isolate the role of broader refinancing conditions. The last explores changing sensitivities over time for DSCR and debt yield.

Together, these specifications allow us to distinguish whether maturity default is explained primarily by loan-level weakness, by a common time-specific resolution environment, or by observable macro-financial constraints.

7.2 Results

Fundamentals

Table 7 displays baseline estimates, showing that weaker fundamentals increase the likelihood of going past maturity. Higher DSCR, higher debt yield, and higher occupancy are associated with lower odds of maturity default. Previously modified loans and larger loans exhibit higher odds of remaining unresolved, consistent with greater structural complexity and coordination frictions in resolution. Loan age at maturity is negatively related to maturity default in this sample window, suggesting that older loans are less likely to linger conditional on other observables.

Property-type effects also remain economically meaningful after controlling for observables. Office exhibits the largest positive fixed effect, indicating elevated maturity default not fully captured by DSCR, debt yield, and occupancy, while lodging shows a negative property-type effect conditional on fundamentals.

These findings indicate that traditional credit-risk metrics remain relevant for late-stage outcomes, but they do not fully explain the time pattern documented in the descriptive evidence.

Time Effects

Adding maturity-year indicators reveals a sharp increase in the probability of going past maturity over time. Loans maturing in 2024 and 2025 are substantially more likely to remain unresolved than loans maturing in 2021, even after controlling for fundamentals and loan characteristics.

This result is central to the paper's lifecycle interpretation. The rise in maturity default is not solely a mechanical consequence of deteriorating loan-level fundamentals. Instead, it is consistent with a common maturity-resolution environment that changes materially over the sample window.

Macro Variables

Replacing maturity-year indicators with macro-financial variables highlights the role of external refinancing conditions. Higher 10-year Treasury yields and elevated monetary policy uncertainty are positively associated with maturity default, while VIX is not statistically significant in this specification.

These results are consistent with a refinancing environment in which higher long-term rates and greater policy uncertainty make it more difficult to commit to resolution terms. This channel is distinct from simple credit weakness; it reflects the broader financing and valuation conditions under which balloon loans must resolve.

Sensitivity Shifts Over Time

A final set of specifications evaluates whether the relationship between fundamentals and maturity default changes across subperiods. Table 8 shows that the negative association between DSCR and maturity default weakens and becomes statistically insignificant in the later period, while the debt-yield relationship becomes more strongly negative and statistically significant.

This shift suggests that near-term cash-flow coverage becomes less central in explaining delayed resolution, while metrics tied more directly to refinancing feasibility become increasingly important. The changing sensitivities reinforce the interpretation that maturity default in the later period is increasingly linked to refinancing constraints rather than immediate operating distress.

7.3 Interpretation

Taken together, the maturity results complement the delinquency hazard findings in Section 6. While underwriting fundamentals continue to predict early-stage distress, the post-pandemic period reveals a distinct late-stage stress channel centered on refinancing and valuation frictions at maturity.

Common time effects and property-type effects contribute meaningfully to maturity outcomes beyond what can be explained by loan-level fundamentals alone. The weakening role of DSCR and strengthening role of debt yield further suggest that delayed resolution is increasingly shaped by capital-market feasibility rather than immediate cash-flow failure.

In combination with the lower realized losses and improved early-stage delinquency outcomes documented for post-crisis cohorts, these findings support a broader lifecycle interpretation of CMBS credit risk: stress has not disappeared, but increasingly migrates from mid-life cash-flow failure toward late-stage refinancing bottlenecks.

CMBS credit risk is therefore best understood as a multi-stage process. Early-stage delinquency and late-stage maturity default operate through related but distinct mechanisms, and the relative importance of those mechanisms varies across issuance cohorts and macro-financial environments.

Section 8 – Conclusion

This paper examines how CMBS credit risk evolves across issuance cohorts and across the loan lifecycle. Descriptive evidence shows that the structure of securitized collateral and the distribution of realized bond losses differ sharply between crisis-era and post-crisis cohorts. These differences motivate a loan-level analysis of how underwriting characteristics translate into distress outcomes across cohorts.

The hazard results show that core underwriting fundamentals—leverage, DSCR, occupancy, and financing costs—remain significant predictors of early-stage delinquency. At the same time, the magnitude and macro sensitivity of these estimated relationships vary across CMBS 1.0, 2.0, and 3.0. Later cohorts exhibit lower realized loss experience and different estimated sensitivities to leverage and financing conditions, patterns that are consistent with shifts in underwriting practices and institutional design over time.

However, lower early-stage delinquency does not imply the absence of credit stress. The maturity-drag analysis shows that in the post-pandemic window, a meaningful share of loans do not resolve at their scheduled maturity date. While weaker fundamentals are associated with a higher probability of going past maturity, common time effects and macro-financial conditions are also statistically and economically significant. The changing association between DSCR and maturity outcomes, alongside the stronger relationship with refinancing-related metrics in the later period, is consistent with a greater role for refinancing feasibility and capital-market conditions in shaping late-stage outcomes.

Taken together, the evidence suggests that CMBS credit risk manifests differently across issuance cohorts and across stages of the loan lifecycle. In earlier cohorts, distress is more frequently observed through early delinquency and capital-structure impairment. In the modern period, early-stage distress is less prevalent, while maturity and refinancing outcomes represent an increasingly important margin of stress.

Several limitations should be noted. Because the analysis is restricted to conduit CMBS collateral, it does not capture credit activity in the growing private credit and non-bank lending channels that have absorbed an increasing share of higher-risk CRE financing in the post-crisis era. To the extent that the migration of riskier credits, particularly transitional and development-stage multifamily loans, to opaque capital sources has favorably selected the conduit universe, the improved delinquency and loss outcomes observed in CMBS 2.0 and 3.0 may partly reflect compositional shifts in what is securitized rather than a uniform improvement in underlying credit quality. Additionally, private credit-financed development can create supply-side pressure on rents and occupancy for stabilized CMBS collateral in overlapping submarkets, a transmission channel that is not captured by the macro-financial controls used in this study.

More broadly, the results indicate that modeling CMBS credit risk as a single event may obscure important lifecycle dynamics. Early-stage delinquency and late-stage resolution reflect related but distinct empirical patterns, and their relative importance varies across issuance cohorts and macro-financial environments. Recognizing these differences is important for interpreting both loan-level performance and bond-level outcomes in the evolving CMBS market.

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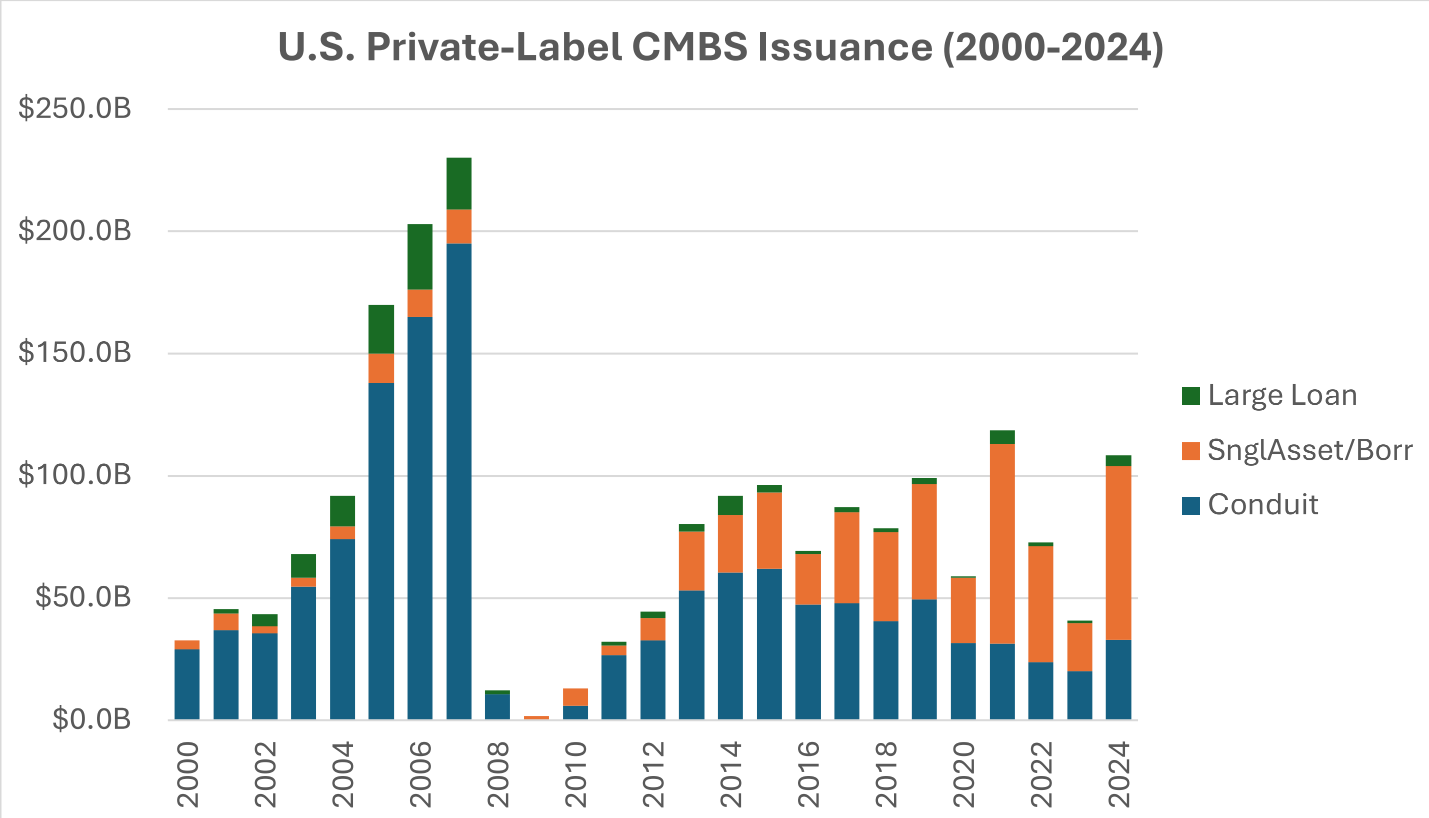
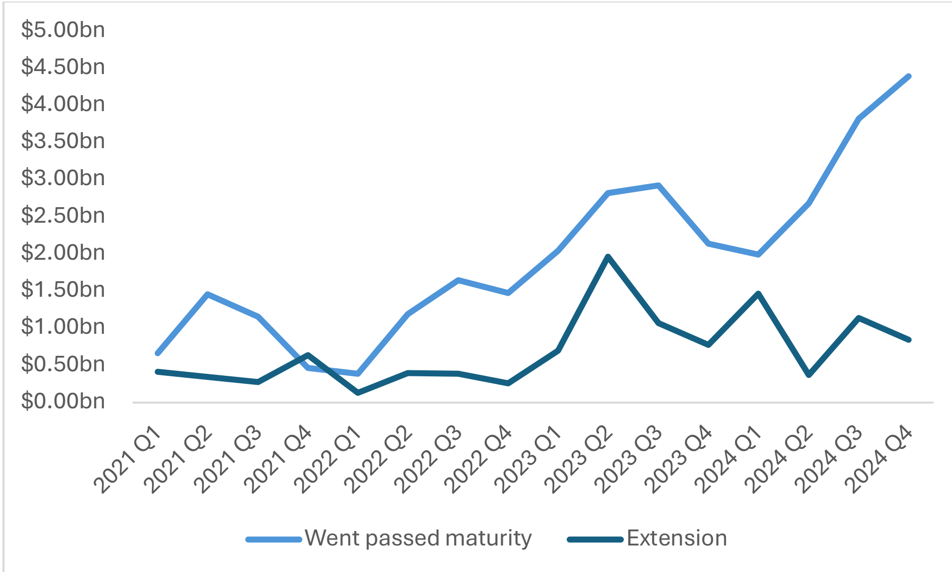
Figure 1 – U.S. Private Label CMBS Issuance (2000-2024)



Note: This figure plots annual U.S. private-label CMBS issuance from 2000 through 2024, shown in billions of dollars. Total issuance in each year is presented as a stacked bar and decomposed into three broad deal categories: Conduit (multi-borrower pools securitized into tranched structures), Single-Asset/Single-Borrower (SASB) transactions (collateralized by a single loan or a small number of loans to a single borrowing entity), and Large Loan transactions (deal collateral dominated by one or more large-balance loans, shown as a separate segment to highlight the contribution of large-loan securitizations to overall annual volume). The stacked format is intended to emphasize both (i) the cyclical pattern of aggregate issuance, most notably the mid-2000s peak, the sharp contraction during 2008–2009, and the post-crisis recovery, and (ii) the changing composition of issuance over time, including the increased prevalence of SASB and large-loan issuance in the post-crisis era relative to the conduit-dominated pre-crisis market.

Figure 2 – Maturity Drag over Time



Note: This figure plots loan volumes that newly went past maturity (top) or newly received an extension (bottom). Both series exclude extension options already in the loan contract at origination.

Figure 3 – Maturity Default Volumes by Property Type

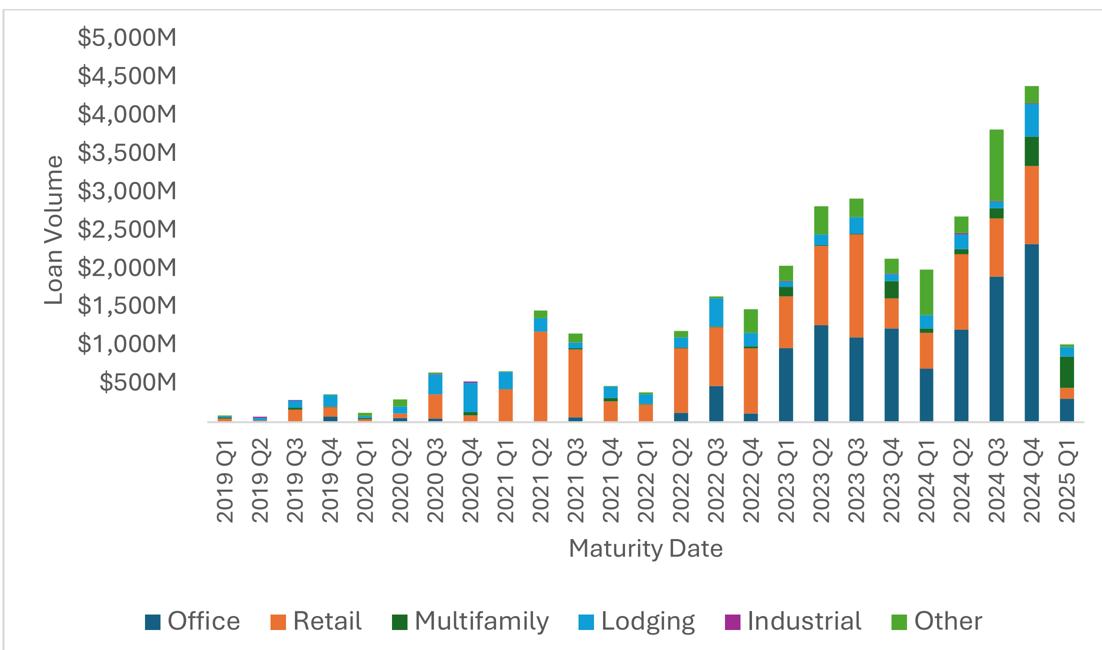


Figure 4 – Share of Loans that Went Past Maturity

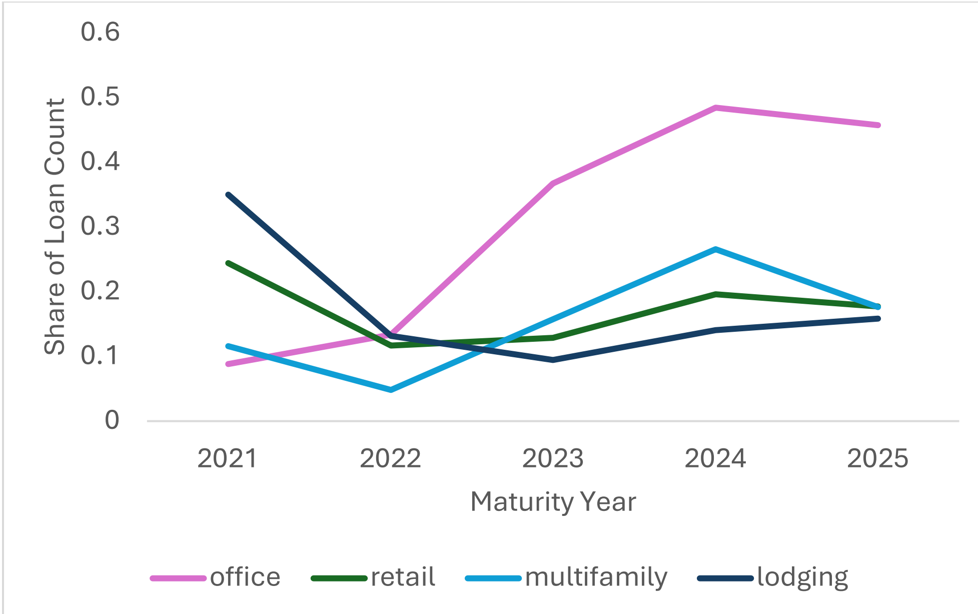


Figure 5 – CMBS Delinquency around Maturity

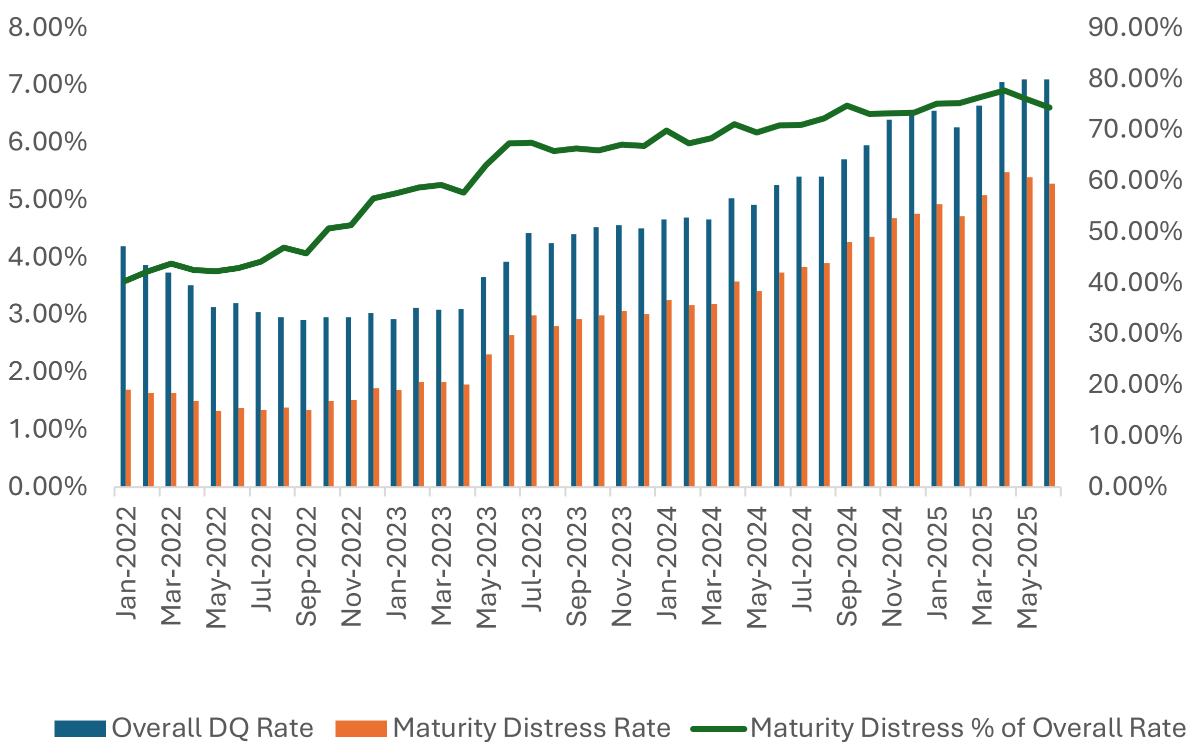


Figure 6 – Loan Outcomes after Maturity

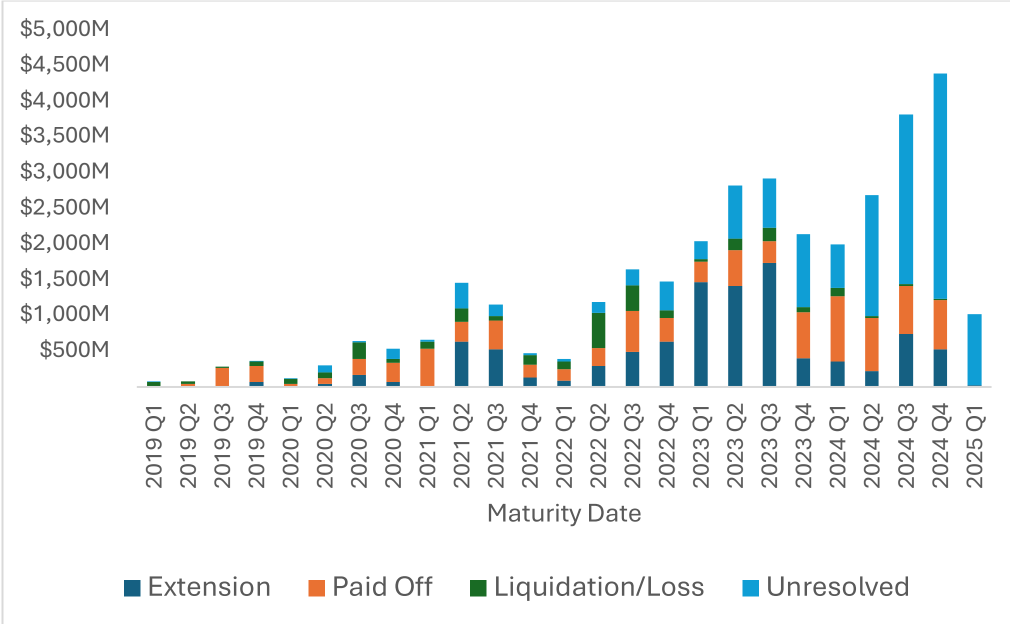


Table 1 – Cumulative Losses by CMBS Cohort (Dollar Loss as a Percentage of Issued Principal)

Cumulative Losses by Cohort and General Rating (All Deals Issued - Includes Deals that have been Paid Off/Retired)*							
Cohort	AAA	AA	A	BBB	BB	B	na
2000			0.0	0.4	24.6	87.2	63.4
2001			0.0	5.7	37.7	82.7	82.6
2002				6.8	28.0	61.6	66.7
2003				4.8	25.3	63.3	83.6
2004		1.1	5.0	21.4	47.4	79.2	96.3
2005	0.1	6.6	16.9	49.9	82.3	98.2	81.8
2006	1.1	26.7	47.7	70.3	58.4	85.4	69.0
2007	1.7	38.9	58.9	70.2	73.6	81.9	80.4
2008	4.5	62.5	81.2	94.0	100.0	100.0	100.0
2009				0.0			
2010				3.7	30.8	28.0	1.9
2011				1.0	4.5	13.7	24.8
2012			0.7	7.0	16.2	26.3	30.7
2013			0.1	1.1	2.5	10.3	19.8
2014				1.8	3.1	8.0	38.9
2015	0.1	0.4	0.4	1.1	2.1	4.0	25.7
2016				0.0	2.3	4.6	15.6
2017			0.0	0.1	0.4	0.5	11.1
2018			0.5	0.6	0.0	0.1	3.3
2019				0.0	0.0	0.1	3.1
2020						0.0	3.8
2021		0.1	0.4	0.3	1.1	0.7	3.0
2022							0.0
2023			0.1				
2024							

Note: This table shows the total cumulative amount of losses by cohort and rating (sum of losses for a given cohort & rating divided by the sum of the original securitized balance). Bond ratings were based on the lowest rating at securitization for each bond. For example, a bond that was split rated A+/A at securitization would be assigned a rating of 'A' in this analysis. Also, ratings are generalized, so a bond rated A- or A+ will be grouped in the 'A' category. Data as of 10/02/2025.

Table 2 – Variable Definitions

Variable Name	Variable Description
ln_curbal	Natural log of the outstanding principal balance
curltv	Current loan-to-value ratio based on the most recent appraised value and the current outstanding loan balance
origltv	Loan-to-value ratio at origination
dscr	The current debt-service coverage ratio (DSCR), defined as net operating income divided by total debt service, based on the most recent financial data available, typically either the most recent year-end or quarter-end
debt_yield	Current net operating income divided by total loan amount
loan_rate	The loan's interest rate.
origterm	The original term of the loan in months.
remterm	The remaining term of the loan in months.
ioperiods	The original number of interest only periods during the loan's term.
fulltermio	Binary variable indicating whether a loan is interest only for its full term.
currentlyio	Binary variable throughout a loan's life indicating whether a loan is currently within its interest only term.
occrate	The most recent occupancy rate of the property.
went past maturity	Binary variable indicating whether or not the loan went past its maturity date
age	Loan age
modified	Binary variable indicating whether the loan has been previously modified
proptype	Property type
tsy10yr	10-year Treasury yield
t10y2y	Spread between the 10-year Treasury yield and 2-year Treasury yield
vix	CBOE Volatility Index
mpu	Monetary Policy Uncertainty Index obtained from Baker, Bloom, and Davis (2016)

Note: This table defines the covariates used in the hazard and maturity analyses.

Table 3 – Selected Summary Statistics for Hazard Sample

	Pooled Sample		CMBS 1.0		CMBS 2.0		CMBS 3.0	
Variable	Mean	Median	Mean	Median	Mean	Median	Mean	Median
ln_curbal	15.45	15.41	15.33	15.27	15.95	15.89	15.95	15.94
curltv (%)	66.36	70.09	67.66	71.60	63.88	67.40	55.58	61.70
DSCR	1.72	1.55	1.67	1.50	1.91	1.79	2.00	1.86
loan_rate (%)	6.28	5.98	6.65	6.31	4.82	4.75	4.55	4.59
origterm (months)	121	120	123	120	114	120	117	120
remterm (months)	115	117	116	116	112	118	114	118
ioperiods	17	0	14	0	18	0	53	36
fulltermio	0.093	0	0.072	0	0.073	0	0.377	0
occrate (%)	93.56	96.61	94.12	97.16	90.78	94.10	92.33	95.00
tsy10yr (%)	4.29	4.63	4.78	4.74	2.22	2.16	2.23	2.26
t10y2y (%)	0.76	0.29	0.64	0.25	1.72	1.55	0.52	0.44
vix	20.09	19.17	20.81	21.53	16.29	14.84	18.58	16.47

Note: Summary statistics are reported for the pooled conduit, single-property sample (combining CMBS 1.0, 2.0, and 3.0 loans) using each loan's first observed loan-quarter in the panel, as well as for each of the individual cohorts: CMBS 1.0 (pools issued 2008 and earlier), CMBS 2.0 (pools issued between 2010 and 2016), and CMBS 3.0 (pools issued 2017 and later). The loan's first observation is defined as the earliest quarter for which the loan enters the performance dataset and has the required covariate information. Variables are defined in Table 2. Macroeconomic and market variables are quarterly averages aligned to the loan's observation quarter.

Table 4 – Selected Summary Statistics for Maturity Sample

Variable	**Mean**	**Median**
DSCR	1.810716	1.6947
debt yield	15.53821	12.30799
age	9.814833	10
ln_curbal	15.99281	15.87243
went past maturity	0.188515	
modified	0.120208	

Notes: This table reports descriptive statistics for the maturity-drag sample, consisting of conduit CMBS loans scheduled to mature from January 2021 through March 2025. Statistics are computed at the loan level using covariates measured as of one year prior to the scheduled maturity date.

Table 5 – Property Type Composition

	Pooled Sample		**CMBS 1.0**		**CMBS 2.0**		**CMBS 3.0**	
	Percent	Cumulative Percent	Percent	Cumulative Percent	Percent	Cumulative Percent	Percent	Cumulative Percent
Lodging	7.2	7.2	5.7	5.7	14.6	14.6	11.2	11.2
Multifamily	24.6	31.8	26.9	32.6	15.4	30.0	13.4	24.7
Mixed-Use	1.7	33.5	0.9	33.6	4.4	34.3	6.2	30.8
Office	16.5	50.0	17.1	50.7	13.6	48.0	14.3	45.1
Other	18.4	68.4	17.2	67.8	20.2	68.2	29.9	75.0
Retail	31.6	100.0	32.2	100.0	31.8	100.0	25.0	100.0

Note: This table reports the distribution of loans in the pooled conduit, single-property sample by primary property type at securitization (or the dominant property type recorded for the loan). “Percent” denotes the share of loans in each category; “Cumulative” reports the running total across rows. Property type categories are used as controls in the multivariate specifications to account for systematic differences in baseline distress risk across CRE sectors. The “Other” category captures property types that do not have a sufficient number of delinquency incidences to be fully identified independently, such as self-storage, industrial/warehouse, manufactured housing, healthcare/medical, cooperative housing, and other specialty property types.

Table 6 – Cox Hazard of a Loan Becoming 60+ Days Delinquent

Variable	Pooled			CMBS 1.0			CMBS 2.0			CMBS 3.0		
	Hazard Ratio	z	P>z	Hazard Ratio	z	P>z	Hazard Ratio	z	P>z	Hazard Ratio	z	P>z
ln_curbal	1.2294	18.80	0.000	1.2204	17.02	0.000	1.3414	7.89	0.000	1.3645	4.19	0.000
curltv	1.0001	6.17	0.000	1.0001	6.03	0.000	1.0087	5.98	0.000	1.0103	1.79	0.073
DSCR	0.4074	-24.86	0.000	0.3485	-30.32	0.000	0.5370	-11.26	0.000	0.6532	-5.64	0.000
loan_rate	1.4329	12.68	0.000	1.3592	9.88	0.000	1.7821	7.01	0.000	1.7017	4.20	0.000
remterm	0.9895	-6.66	0.000	0.9891	-6.63	0.000	0.9838	-1.28	0.202	1.0447	1.54	0.123
currentlyio	1.0447	0.91	0.362	1.1253	2.31	0.021	0.4505	-3.16	0.002	0.6646	-2.10	0.036
fulltermio	0.7401	-5.11	0.000	0.6926	-6.42	0.000	2.5446	3.36	0.001	1.3459	1.46	0.143
occrate	0.9716	-34.16	0.000	0.9721	-32.40	0.000	0.9765	-10.45	0.000	0.9828	-3.91	0.000
tsy10yr	0.7402	-15.37	0.000	0.9329	-2.51	0.012	0.3242	-16.90	0.000	0.1734	-10.43	0.000
t10y2y	1.4179	19.13	0.000	1.5797	23.94	0.000	0.3311	-10.36	0.000	0.2135	-6.02	0.000
vix	1.0189	19.04	0.000	1.0132	10.67	0.000	1.0466	7.21	0.000	1.0702	5.38	0.000
Origterm FE	Yes			Yes			Yes			Yes		
Proptype FE	Yes			Yes			Yes			Yes		
Cohort FE	Yes			Yes			Yes			Yes		
Loan	99,331			77,249			13,706			8,376		
Defaults	10,916			9,369			1,156			391		
Loan-Quarter Obs	2,766,463			2,247,172			384,454			134,837		

Note: This table reports Cox proportional hazards estimates for the time to a loan's first transition to 60+ days delinquent, using a loan-quarter panel constructed from conduit, single-property CMBS loans. Reported coefficients are presented as hazard ratios (exp(β)). A hazard ratio greater than 1 indicates that higher values of the covariate are associated with a higher hazard of becoming 60+ days delinquent, while a hazard ratio less than 1 indicates a lower hazard. The pooled specification is estimated on the full sample and the remaining columns report separate estimates for three issuance cohorts: CMBS 1.0 (pools issued 2008 or earlier), CMBS 2.0 (pools issued 2010–2016), and CMBS 3.0 (pools issued 2017 or later). All covariates are measured at the loan-quarter level unless otherwise indicated. Macroeconomic variables (tsy10yr, t10y2y, vix) are computed as quarterly averages aligned to the loan's performance quarter. Models include additional controls for the original loan term, property type, and cohort/securitization year (not shown). The table reports the z-statistic and associated p-value for each covariate. "Loans" denotes the number of unique loans in the estimation sample, "Defaults" denotes the number of loans experiencing a first 60+ day delinquency event, and "Loan-Quarter Obs." denotes the total number of loan-quarter observations used in estimation. Robust standard errors are used. In addition to the variables listed here, all specifications include controls for the length of the original loan term, property type, and securitization year.

Table 7 – Logistic Regression Estimating the Probability a Loan Fails to Payoff and Passes Maturity

	Baseline		Maturity Year		Macro Variables	
Variable	**Coef.**	**P-value**	**Coef.**	**P-value**	**Coef.**	**P-value**
Intercept	-4.43	0.00	-6.46	0.00	-7.02	0.00
DSCR	-0.29	0.00	-0.28	0.00	-0.28	0.00
debt_yield	-0.03	0.00	-0.03	0.00	-0.03	0.00
age	-0.17	0.00	-0.21	0.00	-0.21	0.00
modified	0.66	0.00	0.60	0.00	0.61	0.00
loan_rate	-0.05	0.39	0.19	0.01	0.15	0.04
ln_curbal	0.41	0.00	0.48	0.00	0.47	0.00
occrate	-0.01	0.00	-0.02	0.00	-0.02	0.00
proptype = Retail	0.02	0.86	0.11	0.31	0.09	0.43
proptype = Multifamily	0.24	0.08	0.20	0.15	0.22	0.13
proptype = Lodging	-1.10	0.00	-1.15	0.00	-1.15	0.00
proptype = Office	0.65	0.00	0.66	0.00	0.64	0.00
Maturity year = 2022			-0.52	0.00		
Maturity year = 2023			0.24	0.12		
Maturity year = 2024			0.88	0.00		
Maturity year = 2025			0.87	0.00		
tsy10yr					0.35	0.00
mpu					0.10	0.03
Observations	5970		5970		5970	
Pseudo R^2	0.14		0.17		0.17	

Notes: This table reports logistic regression estimates for the probability that a CMBS loan experiences maturity drag (i.e., the loan goes past its scheduled maturity date, either through a formal extension or by remaining outstanding/unresolved beyond maturity). The estimation sample includes conduit CMBS loans scheduled to mature from 2021 through March 2025. Reported values are log-odds coefficients (not odds ratios) with associated p-values. All explanatory variables are measured as of one year prior to the scheduled maturity date, so coefficients reflect the association between pre-maturity loan characteristics and the likelihood of going past maturity. The Baseline specification includes loan- and property-level fundamentals and loan characteristics. The Maturity Year specification adds indicator variables for the scheduled maturity year (with 2021 as the omitted reference category). The Macro Variables specification replaces maturity-year indicators with contemporaneous macro-financial measures, including the 10-year Treasury yield and a monetary policy uncertainty index. Monetary policy uncertainty is based on the 3-month trailing average, demeaned and standardized (z-score). Property-type indicators are included in all specifications, with the omitted reference group indicated in the table (the remaining listed property-type coefficients are interpreted relative to that baseline).

Table 8 – Fundamental Sensitivities over Time for Maturity Default

	Early		Mid		Late	
Variable	**Coef.**	**P-value**	**Coef.**	**P-value**	**Coef.**	**P-value**
DSCR	-0.35	0.02	-0.52	0.00	-0.12	0.31
debt yield	-0.01	0.63	0.00	0.96	-0.05	0.00
Observations	1616		1630		2724	
Pseudo R^2	0.22		0.17		0.16	
Controls	Yes		Yes		Yes	

Notes: This table reports logistic regression estimates for the probability that a loan experiences maturity drag (i.e., goes past its scheduled maturity date), estimated separately for three subsamples (Early, Mid, and Late) to evaluate whether the association between key collateral fundamentals and maturity outcomes changes over time. The Early period is 2021 to 2022, the Mid period is 2023, and the Late period is 2024 to 2025. The periods were chosen as they correspond to the three distinct phases of the Fed's rate hiking cycle. The reported coefficients are log-odds estimates with associated p-values. In each subsample, the model includes the same baseline set of controls used in the main maturity-drag specification (loan characteristics and property-type controls; not shown), but the table displays only the coefficients on DSCR and Debt yield for compactness. All explanatory variables are measured as of one year prior to scheduled maturity, so coefficients reflect the relationship between pre-maturity fundamentals and the likelihood of going past maturity within each subsample window. "Controls = Yes" indicates that the full set of baseline covariates and categorical controls are included in each regression even though they are omitted from the table for readability.