Giving Life to Private (Rated) Credit*

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ABSTRACT

We study how ratings inflation can undermine financial regulation and inadvertently fuel the growth of privately rated credit. We exploit the 2021 Risk-Based Capital reform for U.S. life insurers, which aimed to curb reaching-for-yield through its treatment of credit ratings. Following the reform, more exposed insurers—especially those with tighter capital constraints—shifted toward privately rated bonds. These bonds exhibit within-issuer ratings inflation and offer higher yields within rating categories, consistent with greater underlying risk behind similar regulatory labels. Accounting for this inflation substantially attenuates the reform's apparent improvement in portfolio risk. Despite targeting ratings rather than market structure, the reform indirectly increased demand for private bonds. Consistent with this demand shift, firms more connected to exposed life insurers increased their private debt issuance.

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1 Introduction

The rapid growth of private credit has been one of the defining developments in modern financial intermediation. Increasingly, however, recent stress episodes have shifted attention from the growth of the market itself to concerns about how credit risk is assessed in opaque asset markets. Credit ratings, which shape market prices and determine regulatory costs, are central to that problem: when ratings move into private, less transparent channels, measured risk can fall even if underlying risk does not, making the financial system appear safer precisely because risk has become harder to observe.

We ask whether financial regulation, intended to promote financial stability, instead increased demand for privately rated credit. We exploit the 2021 Risk-Based Capital (RBC) reform in the U.S. life insurance industry, which replaced a coarse, six-category schedule for bond capital charges with a more granular framework. The reform was designed to make capital requirements more risk-sensitive and to reduce regulatory arbitrage in the bond market (Becker and Ivashina, 2015). We show that it had an unintended consequence: insurers whose pre-reform portfolios were more adversely affected by the new schedule subsequently increased their holdings of privately rated bonds, especially when they had tighter regulatory capital constraints. This shift is economically important because, as we show, privately rated bonds appear inflated relative to comparable public bonds and offer higher yields within rating categories. The response is concentrated in both private and public bonds with private ratings, indicating that opaque risk assessment, not private placement itself, is the key margin of adjustment.

These concerns have become increasingly salient in policy debates. In June 2024, the National Association of Insurance Commissioners (NAIC) published a special report cautioning against the rapid rise of private letter ratings and potential rating inflation in U.S. insurers' bond portfolios.[1] The Financial Stability Oversight Council (FSOC) has similarly highlighted the limited transparency of private credit and its growing interconnections with life insurers,[2] while the SEC's Office of Credit Ratings has emphasized insurers' increasing use of private ratings, including for regulatory capital purposes.[3] More recently, the U.S. Treasury announced consultations with domestic and international insurance regulators focused on emerging risks and private ratings in private credit markets.[4]

The mechanism we study highlights a broader tension in risk-sensitive financial reg-

[1]The report was withdrawn in May 2025 amid contention among rating agencies.
[2]https://home.treasury.gov/system/files/261/FSOC2025AnnualReport.pdf
[3]https://www.sec.gov/files/jan-2025-ocr-staff-report.pdf
[4]https://home.treasury.gov/news/press-releases/sb0493

ulation.[5] Coarse capital rules invite regulated intermediaries to hold the riskiest assets within a regulatory bucket. More granular rules are designed to reduce this distortion by aligning capital charges more closely with measured risk. But greater risk sensitivity also raises the stakes of measurement: if measured risk depends on credit ratings, and if those ratings can be obtained through less transparent channels, regulation may change not only the risk intermediaries hold but also the rating technology through which that risk is classified. Our setting allows us to test this idea directly. The 2021 reform sharply increased the cost of reaching for yield within rating buckets, while leaving open the possibility that insurers could preserve capital-efficient yield through privately rated bonds due to ratings inflation.

We begin by documenting several new facts about privately rated bonds in life insurers' portfolios. These bonds have become an increasingly important component of insurers' fixed-income holdings. In the fourth quarter of 2020, roughly 5% of industry-level bond par value carried a private letter rating. By the end of 2024, this share had more than doubled to 10.4%. This growth is not confined to a small set of private-equity-backed insurers or to a handful of very large balance sheets. Average private-letter exposures rise across insurer size deciles, and the upper tail includes both private equity-owned insurers and traditional insurers of all sizes. These patterns suggest that private ratings are not a niche feature of a small segment of the insurance sector, but an increasingly common feature of life insurers' bond portfolios.

We then show that privately rated bonds differ systematically from publicly rated bonds. Most privately rated bonds are privately placed, but the overlap is incomplete: a non-trivial share of privately rated bonds are publicly placed, and many privately placed bonds do not carry private ratings. This distinction is central to our analysis. It allows us to separate private ratings from private placement and to ask whether insurers respond to regulation by moving toward illiquid private assets in general, or toward assets whose risk is assessed through a less transparent rating process. Privately rated bonds are also more likely to be secured, more likely to have floating coupons, less likely to be callable, and more likely to have shorter maturities. These characteristics are consistent with a connection to private credit markets. At the same time, because these bonds differ along many observable dimensions, our subsequent tests control for contract features, maturity, private placement status, issuer identity, and credit ratings.

Next, we show that private ratings appear inflated relative to comparable public rat-

[5] A related concern is well known in banking, where risk-weighted capital rules and internal risk models can create incentives to optimize measured rather than underlying risk.

ings. In unconditional comparisons, privately rated bonds carry higher average capital charges, reflecting the fact that they are often issued by riskier borrowers or are less standardized securities. The key question is whether private ratings look more favorable conditional on issuer risk and bond characteristics. To answer this, we exploit within-issuer and within-bond variation. Comparing bonds issued by the same firm, and in our most stringent specification comparing bonds issued by the same firm in the same quarter, privately rated bonds receive lower regulatory risk charges than publicly rated bonds. With issuer-by-time fixed effects and controls, a privately rated bond carries a risk charge about 1.9 percentage points lower than a comparable publicly rated bond issued by the same firm at the same time. Bond-level switching specifications point in the same direction: when a bond transitions from a public rating to a private rating, its risk charge falls significantly. These findings suggest that private ratings classify comparable credit risk more favorably than public ratings, a phenomenon we refer to as ratings inflation.

Ratings inflation is economically meaningful because privately rated bonds also offer higher yields within rating categories. Conditional on their reported rating, privately rated bonds carry substantially higher yields than publicly rated bonds. In our most saturated specification, the yield premium is approximately 95.4 basis points (bps). This magnitude is large: it is comparable to the spread between adjacent investment-grade (BBB) and high-yield (BB) categories. The combination of inflated ratings and higher yields implies that privately rated bonds offer life insurers attractive capital-adjusted returns. This fact motivates the paper's central mechanism: when regulation makes it more difficult to reach for yield within public rating categories, private ratings become a natural substitute.

We then exploit the 2021 RBC reform to test whether insurers respond to tighter capital regulation by rebalancing toward privately rated bonds. The reform replaced the pre-existing six-category capital charge schedule with a more granular twenty-category schedule. Under the old regime, bonds with different letter ratings often received the same capital charge. For example, AAA and A− bonds were both assigned the same NAIC 1 charge (39 bps), creating incentives to hold the riskiest securities within each broad regulatory bucket (Becker and Ivashina, 2015). The 2021 reform substantially reduced this margin by assigning different capital charges to different rating notches (16 bps for AAA, 102 bps for A−). Because insurers entered the reform with different pre-reform rating compositions, the reform generated cross-sectional variation in mechanical changes in capital requirements. We summarize this variation using an insurer-level exposure measure: the change in the portfolio-weighted C-1 risk factor that would occur if the post-reform schedule were applied to the insurer's pre-reform portfolio.

Using this exposure measure in a difference-in-differences design, we find that insurers more exposed to the reform increased their holdings of privately rated bonds after the reform. The effect is economically large. A one-standard-deviation increase in exposure to the reform is associated with a 77 bps increase in the private letter share of the insurer's bond portfolio, a 49% increase relative to an average pre-reform private letter share of about 1.57%. Event study estimates show no evidence of differential pre-trends and indicate that the increase begins around the reform's implementation and continues to grow thereafter. Moreover, this reallocation is strongest among insurers with tighter regulatory capital constraints, linking the portfolio response to the scarcity of regulatory capital rather than to a generic preference for private assets.

We next ask whether this new form of reaching for yield through private rating opacity undermines the reform's intended effect. On paper, the reform appears to induce more exposed insurers to reduce the measured riskiness of their bond portfolios. However, this conclusion depends on taking private ratings at face value. When we adjust privately rated bonds for the ratings inflation documented earlier in the paper, the apparent reduction in portfolio risk is substantially attenuated. Accounting for private-rating inflation reduces the measured improvement in portfolio risk by roughly half. This exercise highlights a core policy implication of the paper: a reform that increases risk sensitivity in one part of the ratings system may induce regulated institutions to migrate to another, more opaque part of the system, resulting in safer portfolios under the regulatory metric while limiting the true reduction in underlying risk.

Finally, we show that the reform spills over from insurers' portfolios to private debt markets. Because private ratings and private placements overlap substantially, an increase in demand for privately rated bonds can also increase demand for private debt. We distinguish this channel from a general reach for illiquidity premia by separating bonds into three groups: publicly placed bonds with private ratings, privately placed bonds with private ratings, and privately placed bonds with public ratings. The reform-induced reallocation is concentrated in the first two groups — bonds with private ratings — rather than in privately placed bonds with public ratings. This evidence reinforces our central finding that private risk certification is a key margin of adjustment.

The demand effects are sizable. Aggregating the dynamic estimates over insurers, the reform generated approximately $33.3 billion of additional demand for privately placed, privately rated debt by the end of 2024, accounting for about 8% of all privately rated bonds held by life insurers at that time. The effect is not merely a reshuffling of existing holdings across investors. On the issuer side, firms more exposed to affected life insurers became more likely to issue privately placed debt after the reform. A one-standard-deviation increase in an issuer's exposure to affected insurers raises its probability of private debt issuance by 56 bps per quarter, a 14.3% increase relative to the pre-reform mean. Hence, regulation shapes not only life insurers' portfolio allocation but also the supply of private debt.

Related Literature. First, our paper connects to the post-GFC literature on credit ratings, which shows that ratings in opaque credit markets can be fragile and distorted (e.g., Coval et al., 2009; Skreta and Veldkamp, 2009; Benmelech and Dlugosz, 2010; Bolton et al., 2012; Griffin and Tang, 2012; Opp et al., 2013). Relative to existing work on structured finance, our paper shifts the focus from securitized products during the crisis to privately rated bonds in insurer portfolios,[6] with particular attention to their overlap with private placements, an important channel through which life insurers gain exposure to private credit markets (NAIC, 2024; AM Best, 2025; Meisenzahl et al., 2025). We also highlight life insurers' need to economize on regulatory capital as a key driver of recent developments in private debt markets. A smaller body of literature has examined how government regulations affect the quality of credit ratings (e.g., Dimitrov et al., 2015; Behr et al., 2018). We take a new angle on this question and uncover how regulation can reshape the relative demand for different types of ratings, thereby altering firms' incentives to obtain them.

The second related literature studies private credit markets more broadly, emphasizing both the rapid growth of private debt and the distinct intermediation technologies used by direct lenders (e.g., Ivashina, 2025a,b; Jang et al., 2025). Within insurance, private placements have been identified as an important channel for life insurers to gain exposure to private credit markets. Meisenzahl et al. (2025) document that life insurers are among the largest providers of private credit through private placements. Relatedly, Carlino et al. (2025) show that life insurers have become increasingly important intermediaries of both public and private credit, through more complex and opaque structures. While existing work mostly studies private credit and private placements as financing categories, we focus on private ratings as a distinct form of credit certification within insurer bond portfolios and show that movement into privately rated bonds is an important adjust-

[6]Recent research by Bonsall et al. (2024) shows that Egan-Jones Ratings Company, a rating agency heavily engaged in private ratings, issues more optimistically biased credit ratings.

ment margin, in addition to movements into private placements.

Third, we contribute to the recent literature that examines how regulation and financial constraints shape insurers' portfolio choices. Ellul et al. (2011) show that regulatory constraints induce fire sales of downgraded corporate bonds by insurers. More recently, Becker et al. (2022) exploit the removal of capital requirements for MBS held by U.S. life insurers and show that insurers retain downgraded MBS more aggressively after the reform, especially when they are more constrained. Koijen and Yogo (2023) formalize how regulatory constraints affect insurers' portfolio decisions in an equilibrium asset pricing model. Closely related, Sen and Sharma (2020) find that life insurers used internal models to overstate the value of corporate bonds during the financial crisis. In this paper, we document that a reform that makes capital regulation more risk-sensitive can unintentionally induce substitution toward privately rated bonds. Also, adding to prior work showing that insurers rebalance toward higher-rated assets when constrained (e.g., Ge and Weisbach, 2021; Bhardwaj et al., 2025; Li, 2026), we show that constrained insurers can simultaneously shift toward privately rated bonds to seek capital-efficient yields.

Our findings also speak to a broader lesson for risk-sensitive financial regulation. A large banking literature shows that capital requirements tied to measured risk can encourage intermediaries to optimize regulatory metrics rather than reduce underlying risk. Under Basel regulation, banks have used securitization, off-balance-sheet structures, and internal risk models to reduce regulatory capital requirements without commensurate reductions in economic risk (Jones, 2000; Acharya et al., 2013; Mariathasan and Merrouche, 2014; Plosser and Santos, 2018; Behn et al., 2022). We document a related but distinct mechanism in the insurance industry. One might expect external credit certification to mitigate this problem by taking risk measurement out of the regulated institution's own models. We show that this is not sufficient. When regulatory capital depends on ratings, and when ratings can be obtained through less transparent private channels, greater risk sensitivity can increase the value of favorable third-party measurement. These concerns are especially important as private credit markets grow and regulated institutions increasingly rely on opaque forms of credit assessment.

Finally, our results speak to the recent literature on reaching-for-yield and regulatory-arbitrage behaviors in the insurance sector.[7] Becker and Ivashina (2015) first document that life insurers reach for yield within coarse regulatory categories prior to the 2021 RBC change by tilting toward bonds with higher yields and CDS spreads within each rating.

[7]Reaching for yield with hard-to-value credit instruments has also been observed in other institutional investors (e.g., Choi and Kronlund, 2018; Efing, 2020).

Merrill et al. (2019) find that life insurers engaged in regulatory arbitrage in structured finance securities before the 2008 financial crisis. Fringuellotti and Santos (2021) find that insurers' CLO holdings increased when regulation treated CLOs more favorably. Our paper further reinforces the hypothesis that opaque markets are attractive to insurers as ratings and complexity can make risk-taking less visible ex-ante while allowing insurers to report higher returns. We further show that privately rated bonds have become the new margin of regulatory arbitrage for life insurers, whose demand in turn helps fuel the recent boom in private debt markets. Complementary to our findings on private ratings, Weinlich (2024) finds that the introduction of a more granular risk charge schedule reduces insurers' reaching-for-yield behavior in public bonds. The existing literature has also found that rising demand from life insurers may affect credit origination by firms (e.g., Fringuellotti and Santos, 2021; Bhardwaj et al., 2025; Kubitza, 2026). We confirm this insight by showing that firms connected to exposed insurers responded to the NAIC RBC reform by increasing their issuance of private bonds post-2021.

2 Institutional Setting and Data

2.1 RBC Regulation for Life Insurers

Life insurance companies are the largest segment of the U.S. insurance industry by assets under management, and their business model centers on issuing long-term annuity and life insurance products funded primarily by investments in fixed-income securities. Medium- and longer-term bonds form the core of their asset portfolios. Accordingly, life insurers are the largest institutional investor group in the U.S. corporate bond market, owning roughly 30% of all U.S. corporate bonds outstanding (Appendix Figure A.1).

Insurers are subject to risk-based capital (RBC) requirements, which set a statutory minimum level of capital calibrated to the risk profile of their assets and liabilities. In principle, insurers are regulated at the state level, but capital standards are coordinated through the NAIC, which introduced the RBC framework in 1993 (NAIC, 1997). Our focus is on the C-1 charge, which applies to fixed-income holdings and is the single largest RBC component, accounting for roughly 30% of total RBC for the life insurance industry (Weinlich, 2024).[8] It is also the component directly affected by the 2021 reform we exploit.

At the bond level, the C-1 charge equals the bond's carrying value multiplied by a

[8] Total RBC aggregates separately computed charges for credit, equity, interest rate, insurance, affiliated and off-balance-sheet, and other business risks. These components are not added linearly; the formula applies a covariance adjustment that grants a discount for diversification across risk categories.

TABLE 1: PRE-REFORM NAIC DESIGNATIONS AND C-1 BASE RISK FACTORS.

NAIC Designation	Rating Range	C-1 Factor (%)
1	AAA to A−	0.39
2	BBB+ to BBB−	1.26
3	BB+ to BB−	4.46
4	B+ to B−	9.70
5	CCC+ to CCC−	22.31
6	CC and below	30.00

Note: This table displays the six pre-reform NAIC designations used to classify insurer bond holdings, the credit-rating range that each designation covers, and the corresponding C-1 base risk factor (in percent of par value) applied to corporate bonds in the RBC formula prior to the 2021 reform.

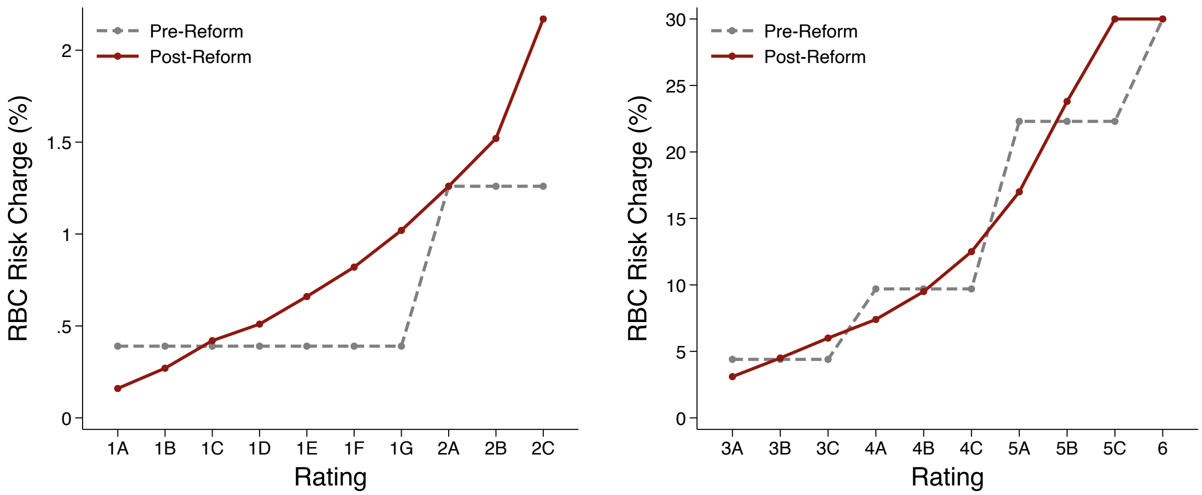
risk factor that depends on its NAIC designation. We use $f(s_j)$ to denote the base risk factor (in percent) associated with the bond's NAIC designation s_j. For rated bonds, the designation follows mechanically from ratings issued by nationally recognized statistical rating organizations (NRSROs) such as S&P, Moody's, and Fitch; insurers have no discretion over the mapping.

Prior to 2021, the NAIC sorted bonds into six broad designations. NAIC 1 spanned all bonds rated AAA through A−, NAIC 2 covered BBB+ through BBB−, and so on through NAIC 6 for the lowest-rated securities. Each designation carried a single, uniform C-1 factor, which we report in Table 1. Because several rating notches were grouped into a single designation, the framework did not distinguish among bonds with meaningfully different credit risk within a bucket: a AAA bond and an A− bond were both classified as NAIC 1 and carried the same 0.39% factor. As Becker and Ivashina (2015) document, this coarseness created an incentive for insurers to reach for yield *within* rating buckets, tilting toward bonds at the lower end of each designation to earn a higher yield at no additional capital cost.

2.2 2021 RBC REFORM

In 2021, the NAIC adopted the most significant revision to the C-1 bond capital framework since the introduction of RBC in the early 1990s. The number of NAIC bond designations expanded from 6 to 20, with each new sub-designation mapped to a specific NRSRO rating notch and assigned its own C-1 factor. The reform was the culmination

FIGURE 1: C-1 RISK FACTORS BEFORE AND AFTER THE 2021 REFORM.



(a) Investment Grade (NAIC 1-2) (b) High Yield (NAIC 3-6)

Note: This figure compares the C-1 base risk factors applied to corporate bonds in the RBC formula before and after the 2021 NAIC reform. The dashed gray line shows the pre-reform schedule, which assigned a single factor to each of six broad NAIC designations. The solid red line shows the post-reform schedule, which subdivides designations 1–5 into finer notches while leaving designation 6 unchanged. The left panel plots investment-grade ratings (NAIC 1–2); the right panel plots high-yield ratings (NAIC 3–6).

of a decade-long process. Substantive progress came after 2020: the American Council of Life Insurers (ACLI) and the NAIC commissioned Moody's Analytics to recommend new factors; Moody's delivered its report on February 1, 2021, and the ACLI released its proposed risk weights on April 15, 2021. The factors were formally adopted by the NAIC's Capital Adequacy (E) Task Force at the Summer 2021 National Meeting, and the revised factors took effect with the year-end 2021 RBC filings.

NAIC 1 was subdivided into seven sub-categories (1A through 1G), NAIC 2 through NAIC 5 into three each, and NAIC 6 was left unchanged. Figure 1 illustrates the change. Within each broad designation, the pre-reform system assigned a single uniform factor (in grey), while the post-reform schedule introduces a monotonically increasing gradient across sub-designations (in red). The contrast is sharpest within NAIC 1: the new factor ranges from 0.16% for AAA (1A) to 1.02% for A− (1G), a more than sixfold difference. A similar pattern holds in the other broad designations, with top-rated bonds generally receiving lower factors and bottom-rated bonds higher factors relative to the pre-reform uniform level.

The reform has two implications for our setting. First, by introducing a within-bucket credit gradient, it raised the cost of reaching for yield within a given NAIC designation and greatly reduced the regulatory arbitrage incentives documented by Becker and Ivashina (2015) within publicly rated bond markets. Second, because insurer portfolios were on average tilted toward the lower end of each rating bucket, the reform produced an aggregate increase in C-1 charges.[9] Importantly, the reform implied substantial variation in both the magnitude and the sign of changes in risk weights across insurers, providing the cross-sectional variation we exploit in our empirical analyses.

2.3 Bonds with Private Letter Ratings

Importantly, the reform did not distinguish between the source of credit certification. Unlike public ratings, a private letter rating (PLR) is a confidential credit rating issued by an NRSRO directly to the issuer or to a narrow group of investors. For regulatory capital purposes, private ratings receive the same treatment as public ratings. This equivalence makes private ratings a potential margin for regulatory capital optimization.

Capital standards at the security level are administered by the Securities Valuation Office (SVO), a unit of the NAIC that assigns NAIC designations to insurer-held fixed-income securities. Under the Filing Exemption process, a bond that carries a current, monitored rating from a NAIC credit rating provider (CRP) is exempt from direct SVO analytical review and instead receives an NAIC designation mapped from eligible NAIC CRP rating(s).[10] As such, Filing Exemption replaces bond-by-bond fundamental analysis by the SVO with a rules-based designation process that translates eligible external ratings into NAIC regulatory categories.

Each bond in insurer filings is reported with a single SVO administrative symbol, which conveys the administrative route associated with the reported NAIC designation. The two categories relevant for this paper are FE, which denotes filing-exempt bonds designated through this rating-based process, and PL, which denotes privately rated bonds. Over our sample period, FE securities account for roughly 84% of insurer-held bonds by par value and PL securities for roughly 9%; the remainder is distributed across other administrative categories, including initial filings pending SVO action or securities tran-

[9] S&P Global Market Intelligence estimated that the new factors would raise the industry-wide C-1 charge by approximately 81%, from $8.8 billion to $15.8 billion (S&P Global, July 2021).

[10] An NRSRO is a credit rating agency registered with the SEC as a nationally recognized statistical rating organization. A CRP, by contrast, is an NRSRO whose ratings the NAIC has accepted for use in its regulatory processes, in particular the filing-exempt process. Thus, CRP status is a NAIC-use status layered on top of SEC NRSRO status: an NRSRO may apply to the NAIC to become a CRP, and the agencies and rating classes accepted for that purpose are listed in Part Three of the *Purposes and Procedures Manual of the NAIC Investment Analysis Office*.

sitioning between designation routes (see Appendix Table A.1).

Because private ratings are not publicly disseminated, the SVO's traditional reliance on observable CRP ratings does not directly extend to them. Beginning January 1, 2022, the NAIC required that every PL-designated security be accompanied by a private rating letter rationale report — an analytical document issued by the rating agency describing the transaction structure, rating methodology, and the credit, legal, and operational risks supporting the assigned rating.[11] Absent such a report, the security loses Filing Exemption status and either must be submitted to the SVO for an analytically determined designation or self-designated as NAIC 5GI, used when an insurer holds a bond for which no current CRP rating is available and assigns it a default designation of NAIC 5 subject to heightened regulatory disclosure.[12] Though rare, transitions out of the PL category are not absent in our sample: of bonds reported as PL in a given year-end, roughly 93.7% remain classified as PL in the following year-end, while the remainder either migrate to FE, are flagged as being in transition, or have their administrative symbol blanked — an outcome consistent with the SVO assigning the designation without relying on a CRP rating.[13]

The set of rating agencies active in the PLR segment differs markedly from the set dominant in public corporate bond markets. Whereas public ratings are concentrated among S&P, Moody's, and Fitch, PLR issuance is dominated by smaller NRSROs — principally Kroll Bond Rating Agency (KBRA), DBRS Morningstar, and Egan-Jones — with only limited participation from the "big three". An October 2025 report by the Bank for International Settlements flags this concentration of PLR activity among sub-scale agencies as a source of potential rating inflation (Aquilina et al., 2025). Concerns about conflicts of interest and rating shopping in this segment have recently moved into the regulatory and political foreground: in July 2025, the Senate Banking Committee requested information from Egan-Jones regarding its methodology, staffing, and "business considerations" in is-

[11]Formally, a rationale report is defined in Part Three, paragraph 13 of the NAIC *Purposes and Procedures Manual of the NAIC Investment Analysis Office* as "an analytical review of the privately rated security explaining the transaction structure, methodology relied upon, and, as appropriate, analysis of the credit, legal and operational risks and mitigants supporting the assigned NAIC CRP rating."

[12]The Valuation of Securities (E) Task Force (VOSTF) deferred enforcement of this requirement through 2024 to build out the necessary system functionality, and first applied the policy at year-end 2024.

[13]The NAIC *Purposes and Procedures Manual of the NAIC Investment Analysis Office* treats SVO administrative symbols as procedural/status indicators rather than the designation itself: administrative symbols "convey information about a security or an administrative procedure instead of an opinion of investment risk." More directly, under the Year-End Carryover Procedure, securities pending SVO action receive temporary symbols such as YE (Year-End) or IF (Initial Filing), but the SVO is instructed to remove the YE or IF symbol once it assigns and publishes the NAIC designation in AVS+. See Part Two, paras. 122 and 188–189.

suing private credit ratings, citing reports that a team of roughly 20 analysts had graded more than 3,000 private credit investments.[14] A withdrawn June 2024 NAIC study, referenced in the same letter, found that the divergence between PLRs and the SVO's own assessments was larger for ratings issued by smaller CRPs.

Private letter ratings are a distinct rating designation that overlaps with, but is not equivalent to, private placements. This overlap is substantial in insurer bond portfolios. Private placements are an important channel through which insurers gain exposure to private credit markets (NAIC, 2024; Meisenzahl et al., 2025). Because many privately placed and other non-public bond investments are held by a limited set of investors, public ratings are often less commercially relevant; in those cases, private ratings can provide the certification needed to obtain favorable regulatory capital treatment. In our data, within the subset of privately placed bonds, around 56% carry a PL administrative symbol, in sharp contrast to the 9% PL share in the overall sample.

Taken together, these institutional features — mechanical equivalence with public ratings for capital purposes, limited external scrutiny prior to 2025, and concentration among smaller rating agencies with potential conflicts of interest (e.g., Egan-Jones, documented in Bonsall et al., 2024) — make privately rated bonds a natural margin along which insurers facing tighter capital regulation in public bond markets may continue to economize on regulatory capital.

2.4 Data

Our empirical analysis primarily draws on a security-by-insurer panel covering the period from 2020Q4 to 2024Q4, which is restricted by reporting requirements for SVO's. The panel is assembled from regulatory filings compiled by S&P Capital IQ Pro and is organized at the insurer-security-quarter level, yielding approximately 16 million observations on 284,676 unique bonds held by 772 unique U.S. life insurers.

The panel is constructed from two source repositories within S&P Capital IQ Pro: *Insurance Investment Holdings (U.S.)* and *Insurance Statutory Financials (U.S.)*. The skeleton of the dataset is the holdings file, which reports the aggregate par value of each bond held by each insurer at a quarterly frequency. All auxiliary information is merged onto this skeleton using the NAIC Company Code, the CUSIP, and the calendar year-quarter as common identifiers.

From the Investment Holdings repository, we obtain a set of security-level character-

[14] See Senator Elizabeth Warren's letter to Egan-Jones.

istics that describe each bond position. The NAIC Designation Category provides the regulatory credit rating at an annual frequency from 2020Q4 onward, which we assume remains constant within each year. Due to the frequency of reporting, in analyses that require explicit use of credit ratings or capital charges, we restrict the analysis to the fourth quarter (Q4) filings. We complement the designation with the SVO Administrative Symbol, which, among other flags, indicates whether a security carries a private letter rating issued by an NRSRO. A private placement indicator, a time-invariant label, identifies securities that are not traded on public markets. We also collect information on the structure of each bond such as whether the bond is secured, is callable, has a floating rate, and whether the bond is loan-backed or designated as a structured security. Finally, we also collect the stated maturity date, which we use to construct the residual maturity of each bond.

We further collect two interest rate measures for each security. First, we collect the effective interest rate used by insurers to amortize future cash flows back to original cost, which insurers report in their statutory filings. Second, we pull data from WRDS on market yields for public bonds. We primarily rely on the effective interest rate data due to its additional coverage of privately placed bonds held by insurers, but conduct robustness exercises with the latter.

From the Statutory Financials repository, we construct a quarterly panel of balance-sheet and regulatory variables, which we merge onto the holdings panel at the insurer-quarter level. We make use of two key variables: insurer size, measured as total assets, and insurer returns, measured as the return on assets. To measure regulatory capital constraints, we further collect the authorized control level risk-based capital (ACL-RBC) and their Total Adjusted Capital (TAC), which are reported at an annual frequency. Using the TAC and ACL-RBC series, we define an insurer's regulatory capital surplus (RCS) as $(\text{TAC} - \text{ACL-RBC})/\text{Total Assets}$. We use RCS as a measure of financial constraints, and discuss this measure in depth in Section 4.3.

Table 2 reports summary statistics on insurers' assets, regulatory slack, and bond portfolio from 2018Q1 to 2024Q4. The median life insurer has total assets of USD 350 million, a return on average assets of 0.61%, and excess capital of about 16 cents for each dollar of total assets. The median portfolio size is USD 200 million, with an underlying median NAIC rating of A and residual maturity of around 13 years.[15]

[15] Summary statistics on ratings are derived from a numeric scaling of the NAIC rating, where a median of 6 corresponds to a NAIC rating of 1F (i.e., A).

TABLE 2: SUMMARY STATISTICS: INSURER CHARACTERISTICS AND BOND PORTFOLIO

	Statistic						
	Mean	SD	Min	p25	Median	p75	Max
Par value ($ Bil)	5.15	19.20	0.00	0.02	0.20	1.84	611.91
Total assets ($ Bil)	11.62	41.45	0.00	0.04	0.35	3.27	414.67
Return on assets (%)	0.89	12.92	-541.13	-0.41	0.61	2.36	424.86
Reg. capital surplus	0.27	0.41	-13.60	0.07	0.16	0.44	1.00
NAIC rating (1-20)	5.59	2.10	1.00	4.46	6.00	6.91	20.00
Residual maturity (years)	12.51	5.62	0.00	8.35	13.13	16.57	40.69

Note: This table reports summary statistics for the insurer-quarter panel over 2020Q4-2024Q4. Bond-level variables are aggregated to the insurer-quarter level using par-value weights. The NAIC rating is mapped to a 1–20 scale. ROAA is the return on average assets. Regulatory capital surplus is the gap between an insurer's total available capital and its required risk-based capital, scaled by the total assets of the insurer. All variables are at a quarterly frequency, except for the regulatory capital surplus, which is available at an annual frequency.

3 CHARACTERISTICS OF PRIVATELY RATED DEBT HELD BY LIFE INSURERS

Having characterized our setting and data, we now turn to an analysis of privately rated bonds held by life insurers. We document four facts. First, we show that private-letter-rated bonds have become an increasingly important component of life insurers' bond portfolios, and that this growth occurred across the industry rather than among a small number of large insurers. Second, we show that privately rated bonds differ substantially from publicly rated bonds along several observable dimensions. They are much more likely to be privately placed, but the overlap is incomplete, which allows us to distinguish private ratings from private placement as separate economic margins. Third, we test whether private ratings are inflated by comparing bonds within issuers and, in our most stringent specification, within the same issuer at the same point in time. These tests indicate that privately rated bonds receive lower regulatory risk charges than comparable publicly rated bonds. Fourth, we show that privately rated bonds offer higher yields within their reported rating categories. Taken together, these facts suggest that private ratings provide a capital-efficient source of yield for insurers and motivate the analysis of the RBC reform in Section 4.

3.1 Fact 1: Life insurers hold a growing share of PLR bonds

We first explore how the life insurance industry's holdings of PLR bonds have changed over the last several years in panel (a) of Figure 2. In the fourth quarter of 2020, roughly 5% of industry-level par value was marked as having a private letter. Over the next four years, this share consistently increased, ultimately more than doubling to 10.4%.

Given the concentration of the life insurance industry, however, one might wonder whether this trend is driven by just a few large insurers. In panel (b), we show that this was not the case: the average private letter share among insurers increased in every size bin. The largest decile of insurers experienced the largest raw increase (5.04% to 10.3%), although medium and medium-large insurers experienced the largest proportional increase. For example, decile 7 insurers' average private letter share increased from 1.76% to 5.66%, a more than 3-fold increase. As such, the growth in private letter holdings is an industry-wide phenomenon.

We next explore the right tail of private letter holdings in the final quarter of our sample. Panel (c) of Figure 2 plots the private letter share of the top 50 insurers, ordering them by rank. Six insurers hold more than half of their bond par value in private letters in 2024, nine insurers hold between 30% and 50%, and the remainder of the top 50 hold between 14% and 30%.

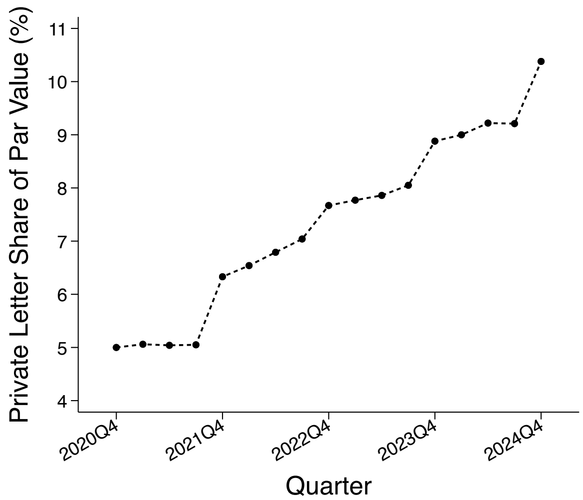
It is worth noting which insurers comprise the top 50. Popular narratives connect private letter investments with private equity (PE)-backed insurers. Based on the figure, this is not inaccurate: three of the largest PE-backed insurers (Forethought, Commonwealth, and Athene) appear in the top 50 insurers by private letter share. However, they are far from representative. Several other large insurers without PE ties, such as Mass Mutual, Allianz, and AIG, also appear in the top 50. Other lesser-known insurance groups, such as Group 1001, have even more exposure, with two of their insurers appearing in the top 8.

3.2 Fact 2: Bonds with Private Ratings are Different

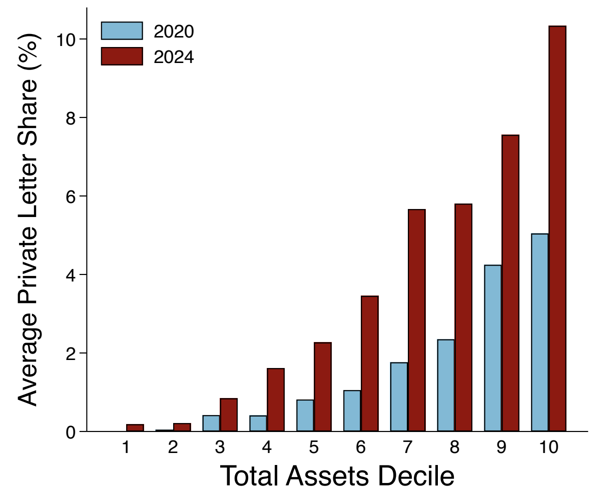
The previous section documented a widespread shift into privately rated bonds. In this section, we explore how the characteristics of these bonds differ from their publicly rated counterparts. We organize our analysis in Table 3, which compares privately rated to publicly rated bonds across a variety of characteristics.

We begin by comparing the contract features and market structure between the two groups of bonds. Privately rated bonds are substantially more likely to be privately

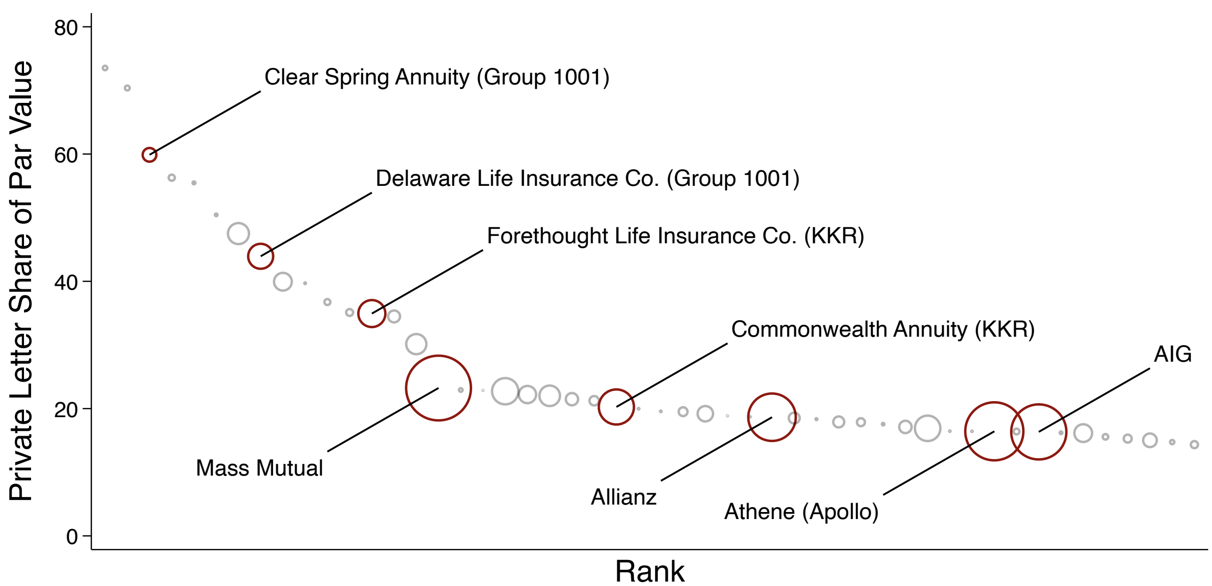
FIGURE 2: LIFE INSURERS' HOLDINGS OF PRIVATE LETTER BONDS



(a) Aggregate PL Share Over Time



(b) PL Share by Size Bin



(c) Top 50 Insurers by Private Letter Share in 2024Q4

Note: This figure describes life insurers' holdings of bonds with private letter ratings. Panel (a) reports the industry-level private letter par value share over our sample period, 2020Q4-2024Q4. Panel (b) reports average private letter par value shares across asset deciles, with blue bars reflecting the beginning of the sample and red bars reflecting the end. Panel (c) plots the top 50 insurers by their private letter share in 2024Q4. Circle sizes are proportional to insurer assets.

placed, although a non-negligible share (19.5%) is publicly placed. They are also more likely to be secured by collateral (42% vs. 25.3%) and to have variable coupon rates (25.3% vs. 13.6%), characteristics commonly associated with private debt and private credit in-

TABLE 3: GENERAL CHARACTERISTICS OF BONDS WITH PRIVATE LETTERS

	Rating Type		
% of par value that is…	Private	Public	Difference
Privately Placed?	81.5	14.1	67.4
Secured?	42.0	25.3	16.7
Variable Rate?	25.3	13.6	11.7
Callable?	20.0	69.8	-49.8
Maturity < 5	23.2	18.5	4.7
Maturity $\in [5, 10)$	28.2	22.5	5.7
Maturity $\in [10, 15)$	18.3	13.2	5.1
Industrials	31.1	8.21	22.89
Financials	26.2	16.4	9.8
Consumer Non-Cyclicals	14.0	10.4	3.6
Utilities	13.6	20.3	-6.7
Issuer Obligation	61.1	74.3	-13.2
Loan-Backed/Structured Security	24.9	13.1	11.8

Note: This table reports par-value-weighted averages of and differences between privately and publicly rated bonds held by life insurers. The first section reports the share of par value that is privately placed, senior secured, has a variable interest rate, and is callable. The second section reports the share of par value that has less than 5 years of residual maturity, between 5 and 10 years, and between 10 and 15 years. The third section reports the share of par value in different industry groups among publicly placed bonds using the Thomson Reuters Business Classifications. The fourth section reports the share of par value in different asset classes, including issuer obligations and loan-backed or structured securities.

struments. Conversely, they are less likely to be callable (20% vs. 69.8%). They also tend to have shorter maturities, which is likely inherited from their exposure to private placements: 69.7% of private letter par value has a maturity of less than 15 years, compared to 54.2% of public letter par value.

We also explore differences in their industry and structure. Among publicly placed bonds,[16] private ratings are much more concentrated in industrials (31.1% vs. 8.2%) and financials (26.2% vs. 16.4%), have similar exposures to consumer non-cyclicals (14% vs. 10.4%), and are less concentrated in utilities (13.6% vs. 20.3%). Among bonds with explicitly stated asset categories, they are more likely to be a (non-mortgage) loan-backed

[16] We obtain information on bond industry categories from Thomson Reuters Business Classifications (TRBC), which covers only public bonds.

structured security (24.9% vs. 13.1%).

Although these characteristics are informative about the underlying bond issuers and connections to private debt markets, they also raise concerns that meaningful differences in the economic characteristics of the bonds, such as yields or ratings, may simply be an artifact of their contract features or market structure. In what follows, we take care to control for these characteristics.

3.3 Fact 3: Bonds with Private Ratings are Inflated

We now ask the first of our central questions: are private letters artificially inflated relative to their public counterparts, conditional on contract characteristics? The challenge here is that observed differences in ratings may merely reflect differences in the issuers themselves, as it is well known that private credit specializes in middle-market firms, which are on average riskier (IMF, 2024; Cai and Haque, 2024).

To address this concern, we explicitly test for ratings inflation using several different sources of variation. All of our tests take the form

$$\text{Risk-Factor}_{ibt} = \beta \, \text{PL}_{ibt} + \text{controls} + \text{fixed effects} + \varepsilon_{ibt} \tag{1}$$

where PL_{ibt} is an indicator for whether bond b of issuer i is privately rated in quarter t,[17] and Risk-Factor_{ibt} is its ex-post RBC charge expressed in percentage points. For example, if bond b is rated A$-$ at time t, then $\text{Risk-Factor}_{ibt} = 1.02$. In specifications with controls, we include indicators for whether a bond is privately placed, is callable, is senior secured, or has a floating interest rate, as well as indicators for 3-year residual maturity bins. In these regressions, we only use data from annual (Q4) filings since this is the frequency in which insurers report ratings information. We stress, however, that the annual reports are contemporaneous holdings as of year end and do not represent holdings over the entire year, which allows us to interpret each period as a distinct point in time.

We begin by looking at the full cross-section of bonds, which we accomplish by using time (year) fixed effects. Given that risky issuers are more likely to receive a private rating, we expect that $\beta > 0$ in this specification. In the second specification, we include an issuer fixed effect. This restricts the estimation to two sources of variation. First, bonds

[17] Note that PL ratings are persistent: across years and within-insurer-bond pairs, among bonds designated PL in Q4 of a given year, 93.7% are designated as PL again in Q4 of the following year. Similarly, transitions from CRP-approved to PL ratings are very rare: only about 0.1% of bonds designated FE in Q4 of a given year transition to a PL designation in Q4 of the following year.

may switch into or out of a private letter, creating variation at the bond level over time. Second, issuers may simultaneously have bonds outstanding that are both publicly and privately rated, which creates variation at the issuer level at a given point in time. If there is ratings inflation present within both of these sources of variation on average, we expect $\beta < 0$.

We then separate the analysis along the two sources of variation. First, in our third specification, we exploit only within-issuer cross-sectional variation in bonds by interacting the issuer and time fixed effects. We further strengthen the analysis in specification four by adding the bond-level controls. Finally, in the fifth specification, we compare only bonds that switch into or out of a private letter rating by using time and bond fixed effects, which control for all time-invariant bond-specific characteristics. In all three of these specifications, $\beta < 0$ is consistent with ratings inflation.

To ensure that our analyses are sensible, we make a few further restrictions to our sample. First, we restrict the sample to bonds whose characteristics do not change due to restructuring (e.g., moving from unsecured to secured). Second, since insurers themselves may rely on different ratings for the same bond when reporting risk-based capital, we restrict our sample to include only bonds in which all insurers agree on the rating.[18] We report a detailed breakdown of the coverage of the different samples and specifications in Appendix Table A.4.

We report our results in Table 4. As predicted, in the cross-section of bonds held by insurers, private letters are associated with higher risk charges, reflecting the generally greater level of risk in these bonds compared with the average publicly rated bond. However, once we exploit within-issuer and within-bond variation, the coefficient of interest becomes negative and is consistently statistically significant at the 1% level. Using all sources of variation, we find that private letters are associated with an approximately 194-basis-point reduction in risk charges (column 2).

While both within-issuer (columns 3-4) and within-bond (column 5) variations point to ratings inflation, the within-issuer variation is slightly stronger: given two bonds outstanding of the same issuer at the same time, even conditional on granular bond characteristics, the one with a private letter rating is associated with a risk charge that is 194 bps lower. Switches into private letters generate slightly lower average reductions in risk

[18] We emphasize that these restrictions do not alter our results qualitatively. See Appendix Table A.2 for results where we reintroduce bonds with time-varying controls, and see Appendix Table A.3 for results where we additionally allow for disagreements in reported ratings across insurers. In the latter, we take the average risk factor reported by the different insurers as the dependent variable.

TABLE 4: BONDS WITH PLRS HAVE FAVORABLE RATINGS

	Dependent Variable: Risk Factor$_{ibt}$				
Model:	(1)	(2)	(3)	(4)	(5)
Private Rating	0.8492***	-1.935***	-1.915***	-1.940***	-1.755***
	(0.1329)	(0.3202)	(0.4403)	(0.4594)	(0.3725)
Privately Placed				0.4113	
				(0.3391)	
Secured				-0.6320***	
				(0.0619)	
Fixed Rate				-0.3969***	
				(0.1524)	
Callable				0.0209	
				(0.0329)	
Structured Security				-0.5581***	
				(0.1139)	
Year FE	Yes	Yes			Yes
Maturity bin FE	Yes	Yes	Yes	Yes	Yes
Issuer FE		Yes			
Issuer × Year FE			Yes	Yes	
Bond FE					Yes
Observations	236,358	232,718	195,741	176,656	213,187
R^2	0.01716	0.70260	0.67811	0.68797	0.90153
Within R^2	0.00127	0.00249	0.00111	0.00962	0.00499

Note: This table reports regression estimates corresponding to equation (1). The dependent variable is a bond's risk factor in year t, and the primary independent variable is an indicator for whether at least one insurer marks bond b as privately labeled. Column (1) includes year and maturity bin fixed effects. Column (2) adds issuer fixed effects. Column (3) replaces the year and issuer fixed effects with issuer × year fixed effects. Column (4) adds bond-level controls. Column (5) replaces the issuer × year fixed effect with a year and bond fixed effect. Controls are dummies for whether a bond is privately placed, senior secured, fixed-interest, callable, or structured security. Maturity buckets are three-year bins from 0 to 30 years. The sample conditions on consistent control variable reporting and consistent ratings designations across insurers, and only considers data from annual reports. Standard errors are clustered at the bond level and are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

charges (176 bps). These results suggest a motive for firms to issue debt with a private rating, which we explore in Section 5.

The economic magnitudes of our estimates are meaningful. If we extrapolate to all bonds with private letters, then our most stringent specification (column 5) indicates that as of 2024Q4, insurers are saving \$7.34 billion (\$8.11 billion using specification 4) in (par value weighted) C-1 risk charges by holding these bonds.[19] According to our estimates, industry-wide par value weighted C-1 risk charges total about \$51 billion in 2024Q4, which implies that the industry is facing 12.6% (13.7%) lower risk charges than they would if the bonds were not inflated. Since C-1 charges account for approximately 30% of total risk-based capital (Weinlich, 2024), this amounts to a 3.8% (4.1%) reduction in industry capital. These numbers are consistent with practitioner reports: for example, Fitch Ratings (2025) estimates that if regulators were to arbitrarily downgrade all privately rated bonds held by life insurers by one, two, or three ratings notches, the reduction in capital would be 3%, 6.8%, and 11.7%, respectively.[20]

3.4 Fact 4: Bonds with Private Ratings have Higher Yields

While the results from the previous section are indicative of ratings inflation, this is only economically meaningful if private letters are associated with better returns. Otherwise, insurers could alternatively hold publicly rated bonds with identical ratings and earn the same capital-adjusted return, which would likely be a dominant strategy given the administrative costs of privately rated bonds. To test whether private letters are associated with better returns, we estimate the regression

$$\text{Yield}_{ibt} = \beta \, \text{PL}_{ibt} + \text{controls} + \text{fixed effects} + \varepsilon_{ibt} \tag{2}$$

where Yield_{ibt} is the effective interest rate reported by insurers in their statutory filings. We consider only bonds purchased by at least one insurer in a given quarter, ensuring that their reported yields are not stale.[21] As robustness, we also conduct the same analysis using market yields of publicly placed bonds using data from WRDS. These results can be found in Appendix Table A.5.[22] Since our main analyses use information on credit ratings, we restrict our analysis to interest rates taken from annual filings as in Section 3.3.

[19]We calculate these numbers by multiplying the risk factor savings, $|\hat{\beta}|$, by the total par value of private letter bonds held by life insurers in 2024Q4. This total is about \$418 billion, implying that the total savings are $|\hat{\beta}| \times$ \$418 billion.

[20]Specifically, in each of their downgrade scenarios, the implied reduction in capital can be computed as Actual RBC Ratio/Counterfactual RBC Ratio.

[21]Because bonds are typically held to maturity by insurers, they are not marked to market. Therefore, reported rates for bonds that were purchased in the past may not reflect market rates.

[22]In these regressions, we necessarily cannot include a private placement indicator as a control, which is why they are not included as a main specification.

If ratings inflation is not important economically, we should expect that private letters do not predict meaningful differences in yields conditional on credit rating. We account for this in equation (2) through a rating $\times$ time fixed effect. In this case, a positive β estimate indicates that at a particular point in time, bonds that are privately rated offer higher yields relative to identically (but publicly) rated bonds.

We report our results in Table 5. Unsurprisingly, in the cross-section of bonds, those with a private rating have higher yields. Given that private letters tend to be allocated toward riskier issuers, this is to be expected. The sign and significance remain, however, even when looking within rating-time bins and when controlling for bond-level characteristics. This corroborates the evidence on ratings inflation: bonds with private letters seem to have yields that reflect riskier bonds within a given ratings class.

The magnitudes, even when including rating $\times$ time and maturity bin fixed effects, are meaningful: they suggest that private letters carry a 95 bps spread over public letters. According to ICE BofA credit spread data between May 2023 and December 2024, the average option-adjusted index BBB-BB spread was 88 bps, just under our estimate. This is not far off from our ratings inflation estimates of 1.75-1.94 percentage points, which is approximately the difference in risk charges between BBB/BBB+ and BB+ bonds.

We also carry out a specification in which we replace the rating $\times$ time fixed effect with an issuer $\times$ time fixed effect. As with the ratings inflation regressions, this specification allows us to compare two bonds of the same issuer at the same point in time. This allows us to test for the possibility that private letter ratings are not inflated at all, and are rather capturing the underlying risk associated with some unobserved bond characteristic. In our framework, this would imply $\beta < 0$. We find a negative but not statistically significant coefficient on the private letter indicator, implying that yields are slightly, but not meaningfully, lower for private letters within a given issuer.[23] This supports our central hypothesis that private ratings are inflated relative to public ratings.

4 RBC Reform and Life Insurers' Demand for PLR Bonds

We now test our central hypothesis that insurers, in response to tightening capital regulation, shifted their bond portfolios toward privately rated bonds which, as we demonstrated in the previous section, offer capital-efficient yields due to ratings inflation. We start by defining a variable that captures the exposure to the reform, and then use this

[23]Our estimates using public bond yields in Appendix Table A.5 also statistically insignificant, but are slightly positive instead.

TABLE 5: BONDS WITH PLRS HAVE HIGHER YIELDS

	Dependent Variable: EIR_{ibt}			
	(1)	(2)	(3)	(4)
Private Rating	1.793***	1.436***	0.9542***	-0.3526
	(0.1239)	(0.1239)	(0.1458)	(0.3118)
Privately Placed			0.0624	-0.0793
			(0.1271)	(0.1947)
Secured			0.2853**	0.3542
			(0.1175)	(0.2594)
Fixed Rate			-0.4236***	0.2198
			(0.1226)	(0.3943)
Callable			-0.1659*	0.0768
			(0.0872)	(0.0967)
Structured Security			0.8786***	-0.1949
			(0.1035)	(0.3347)
Year FE	Yes			
Rating × Year FE		Yes	Yes	
Issuer × Year FE				Yes
Maturity FE	Yes	Yes	Yes	Yes
Observations	84,546	62,791	29,355	24,342
R^2	0.06984	0.10787	0.15644	0.46404
Within R^2	0.00233	0.00163	0.00845	0.00039

Note: This table reports regression estimates corresponding to equation (2). The dependent variable is bond b's effective interest rate reported by life insurers in quarter t, which is constructed from insurer Schedule D filings and restricted to fresh acquisitions (bonds originated in the quarter of observation) to isolate market yields. The primary independent variable is an indicator for whether at least one insurer marks bond b as privately labeled at time t. Column (1) adds year and maturity-bucket fixed effects. Column (2) replaces the year fixed effect with a rating × year fixed effect. Column (3) adds bond-level controls. Column (4) replaces the rating × year with an issuer × year fixed effect. Controls are dummies for whether a bond is privately placed, senior secured, fixed interest, callable, or a structured security. Maturity buckets are three-year bins from 0 to 30 years. Standard errors are clustered at the bond level and are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

variable to study insurers' rebalancing behavior.

4.1 Defining Exposure to the Reform

Our central argument is that, by making it more costly to reach for yield within publicly rated bond markets, the reform increased the relative attractiveness of privately rated bonds as an alternative channel for regulatory capital optimization. To test this, we require an insurer-level measure of exposure to the reform, exploiting the fact that insurers differ in the composition of their pre-reform bond portfolios and therefore experience different mechanical changes in capital requirements when the new schedule is applied.

For each insurer i, we compute the par-weighted average C-1 risk factor under both schedules,[24] holding portfolio composition fixed at its 2020Q4 level:[25]

$$\overline{f}_i^k = \frac{\sum_{j \in \mathcal{P}_i} \mathrm{Par}_{ij} \times f^k(s_j)}{\sum_{j \in \mathcal{P}_i} \mathrm{Par}_{ij}}, \quad k \in \{\mathrm{pre}, \mathrm{post}\}, \tag{3}$$

where $\mathcal{P}_i$ denotes the set of bonds in insurer i's portfolio, Par_{ij} is the par value of bond j, and $f^k(s_j)$ is the risk factor under schedule k. Our insurer-level exposure measure is the mechanical change in the par-weighted average capital charge:

$$\Delta\overline{f}_i = \overline{f}_i^{\mathrm{post}} - \overline{f}_i^{\mathrm{pre}}, \tag{4}$$

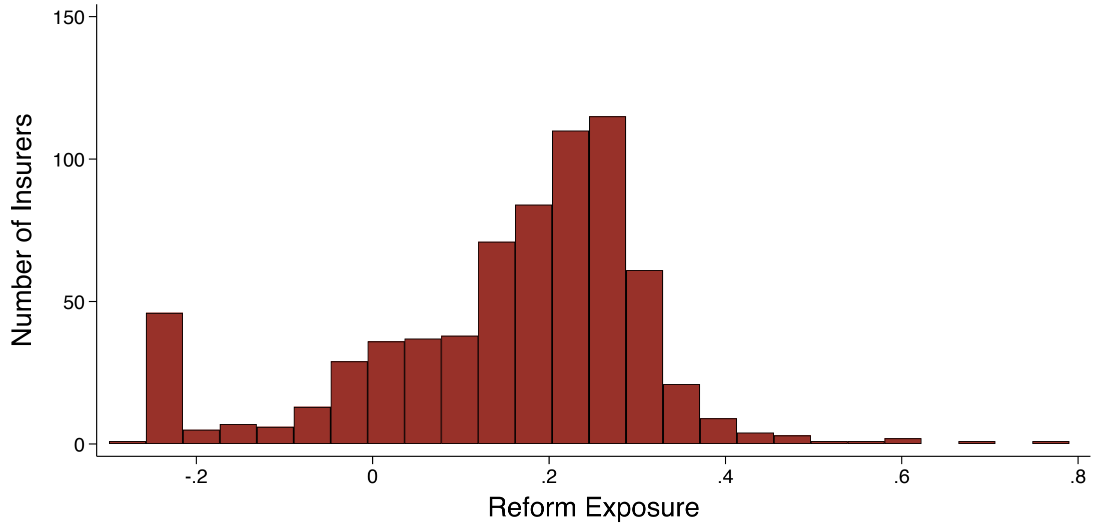
expressed in percentage points. Because the portfolio is held fixed at its pre-reform composition, $\Delta\overline{f}_i$ captures only the mechanical effect of the schedule change and is not contaminated by endogenous rebalancing. Insurers with pre-reform portfolios concentrated at the bottom of their rating buckets receive a larger positive value of $\Delta\overline{f}_i$.

Figure 3 shows the cross-sectional distribution of $\Delta\overline{f}_i$ across life insurers. The distribution is centered above zero, but exhibits substantial cross-sectional variation: some insurers experienced small decreases in capital requirements, while those tilted toward the bottom of pre-existing regulatory buckets faced increases of up to 0.5 percentage points or more. The average exposure is 15.4 bps, and the standard deviation is 16.2 bps.

[24]Although RBC charges are computed using book-adjusted carrying values (BACV) in practice, we use par values for two reasons. First, BACVs are only available annually, while par values are available quarterly, enabling a more granular time series. Second, BACVs are based on insurers' internal models, while par values are standardized across insurers.

[25]We use insurers' 2020Q4 portfolios to avoid potential anticipatory rebalancing effects given the timeline of the policy reform, which we outlined in Section 2.3.

FIGURE 3: DISTRIBUTION OF THE RBC SHOCK ACROSS LIFE INSURERS



Note: This figure displays the cross-sectional distribution of reform exposure, $\Delta\overline{f}_i$, defined as the gap between observed 2020Q4 average C-1 risk factors and counterfactual C-1 risk factors using the new RBC charges mandated by the bond reform. Exposures are reported in percentage points.

4.2 RBC REFORM AND PLR HOLDINGS

Our methodology uses a classic difference-in-differences specification using the insurer-level exposure $\Delta\overline{f}_i$ as our treatment variable. In the time dimension, we compare insurers before and after the 2021Q4 bond reform using an indicator $\text{Post}_t = \mathbf{1}\{t \geq \text{2021Q4}\}$. Our specification is then

$$\text{SharePL}_{it} = \beta\, \Delta\overline{f}_i \times \text{Post}_t + \gamma' \boldsymbol{X}_{it} + \alpha_i + \delta_t + \varepsilon_{it} \tag{5}$$

where SharePL_{it} is the par value share of insurer i's bond holdings that carry a PL SVO designation in quarter t. We include controls for insurer size (log assets), which ensures that our results aren't driven by differences in access to private letters by different-sized insurers, and insurer returns (ROA), which absorb general profitability motives for insurers' portfolio choices.

The key parameter in our setup is β. If insurers that are more exposed to the reform (i.e., those with a greater change in their average capital charge, $\Delta\overline{f}_i$) experience a tightening in their financial constraints due to the policy, they may shift risk away from higher-yield public bonds into privately rated bonds in order to maintain higher yields but avoid the heightened capital charges. We therefore expect $\beta > 0$.

We report our results in Table 6. Column (1) reports results without fixed effects,

TABLE 6: EFFECTS OF THE REFORM ON PLR HOLDINGS

	Dependent Variable: SharePL_{it}			
	(1)	(2)	(3)	(4)
Post_t	0.6227***			
	(0.1369)			
$\Delta\bar{f}_i$	6.2945***	6.2929***		
	(1.0754)	(1.0758)		
$\Delta\bar{f}_i \times \text{Post}_t$	4.8868***	4.8755***	4.6610***	4.7629***
	(1.1013)	(1.1012)	(1.0733)	(1.0713)
log Assets_{it}				0.8453***
				(0.2586)
ROA_{it}				0.0002
				(0.0015)
Quarter FE		Yes	Yes	Yes
Insurer FE			Yes	Yes
Observations	11,428	11,428	11,424	11,356
R^2	0.077	0.080	0.840	0.841
Within R^2	0.077	0.068	0.016	0.023

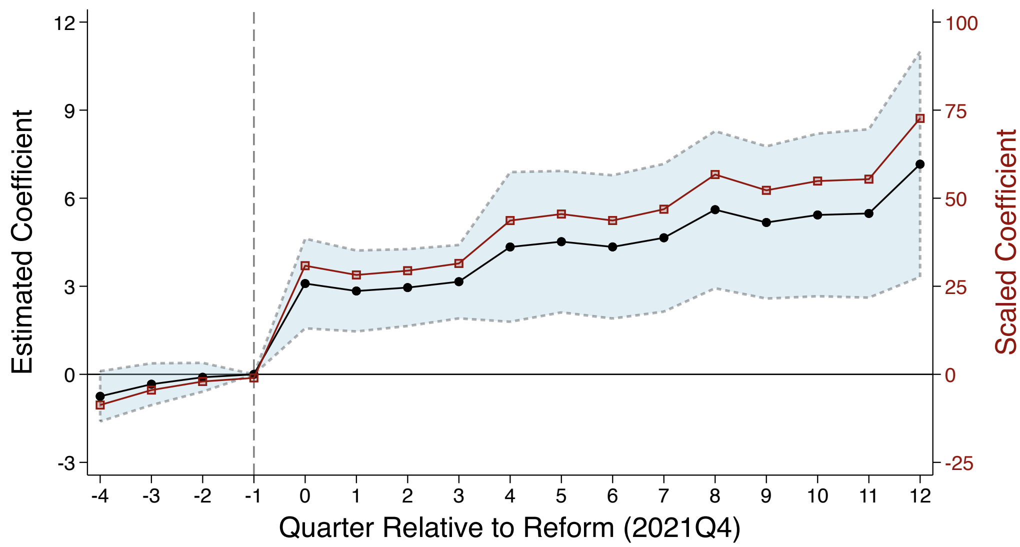
Note: This table reports regression estimates corresponding to equation (5). The dependent variable is insurer i's par value share of privately rated bonds in quarter t. The independent variable is an interaction between a post-reform dummy (Post_t) and the insurer's bond reform exposure, $\Delta\bar{f}_i$. Column (1) does not include fixed effects. Column (2) adds quarter fixed effects. Column (3) adds insurer fixed effects. Column (4) adds log assets and return on assets controls. Standard errors are clustered at the insurer level and are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

column (2) adds quarter fixed effects, column (3) adds insurer fixed effects, and column (4) adds in the size and ROA controls. We cluster our standard errors at the insurer level.

The results are consistent with our private letter rebalancing channel. In all specifications, the coefficient β is positive and significant at the 1% level, indicating that more exposed insurers rebalanced toward privately rated bonds at a higher rate. The magnitudes are also meaningful: under the full specification (column 4) and given a one-standard-deviation increase in the reform exposure ($\approx$ 16.2 bps), insurers increase their private letter portfolio weight by about 4.76×16.2 bps = 77 bps, which is a 49.1% increase over the 2020Q4 mean (1.57%).

To ensure our results are not driven by pre-trends, we also estimate the dynamic coun-

FIGURE 4: DYNAMIC EFFECTS OF THE REFORM ON PRIVATE LETTER HOLDINGS



Note: This figure displays the dynamic estimates corresponding to equation (6). Black dots (left axis) correspond to the raw coefficients. Red squares (right axis) correspond to coefficients that are scaled by one standard deviation of $\Delta \overline{f}_i$ and divided by the mean private letter portfolio share in 2020Q4. Shaded areas correspond to 95% confidence intervals relative to the raw coefficients (left axis). Controls include log assets and return on assets. Standard errors are clustered at the insurer level.

terpart to (5), which takes the form

$$\text{SharePL}_{it} = \sum_{\tau \neq 2021\text{Q3}} \beta_\tau \Delta \overline{f}_i \times \mathbf{1}\{\tau = t\} + \gamma' \mathbf{X}_{it} + \alpha_i + \delta_t + \varepsilon_{it} \tag{6}$$

We estimate the event study using the full specification corresponding to column (4) in Table 6. We display the results in Figure 4. The pre-reform estimates are statistically insignificant at the 5% level. After the reform, the share of privately rated bonds held by more-exposed insurers increased sharply and continued to rise gradually thereafter. The estimates suggest that after 3 years, a one-standard-deviation increase in reform exposure led to a 74% increase in private letter portfolio share relative to the 2020Q4 mean.

4.3 HETEROGENEITY: THE ROLE OF CONSTRAINED INSURERS

We now study how financial constraints affect the incentives to reach for yield using private ratings. On their own, changes in capital charges are not necessarily sufficient to explain the rebalancing activity we observed in the previous section. For example, if an insurer's total available capital (TAC) is far above required capital, then even a modest increase in its risk charges may not be prohibitive.

To assess the role of financial constraints, we augment our previous analyses with a measure of financial constraints that we term *regulatory capital surplus*, or *RCS*. We follow Becker and Ivashina (2015) in defining regulatory capital surplus as the gap between an insurer's total available capital (TAC) and its required (risk-based) capital (RBC), scaled by the size of the insurer:

$$\text{RCS}_{it} = \frac{\text{TAC}_{it} - \text{RBC}_{it}}{\text{Total Assets}_{it}},$$

which captures the regulatory slack of insurer i at year-quarter t relative to its minimum statutory capital requirement, scaled by its asset base.

We plot the distribution of RCS in 2020Q4 in Figure 5. The median insurer carries a 14.8% capital surplus relative to their size, while the mean insurer carries a 26.9% surplus. The distribution is skewed, with the top 5% of insurers holding a large capital surplus ($>$ 90%), indicating either low levels of required capital (and therefore very safe bonds) or very large capital buffers.

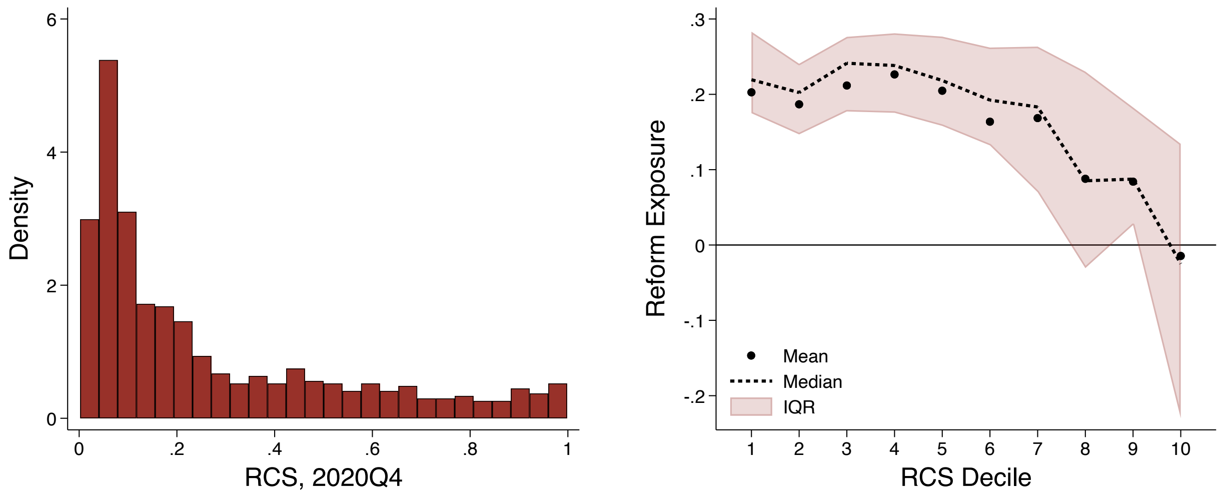
We also show that insurers' RCS correlated with their exposure to the reform in Figure 5. In particular, insurers with RCS below the median experienced an approximately 20 bps increase in their bond risk charges. In contrast, insurers with RCS above the median experienced an approximately 10 bps increase. However, despite the strong correlation between RCS and the reform exposure, there is substantial heterogeneity even within RCS deciles: even for the lowest decile of RCS, the interquartile range is approximately 10 bps, which corresponds to approximately 0.56 standard deviations of reform exposure.

We exploit the heterogeneity in RCS to explore whether financial constraints were a driving force behind life insurers' rebalancing behavior. We augment our baseline regressions to

$$\begin{aligned} \text{SharePL}_{it} = {} & \beta_0 \Delta\overline{f}_i \times \text{Post}_t + \beta_1 \text{RCS}_i \times \text{Post}_t \\ & + \beta_2 \Delta\overline{f}_i \times \text{RCS}_i \times \text{Post}_t + \gamma' \boldsymbol{X}_{it} + \alpha_i + \delta_t + \varepsilon_{it}. \end{aligned} \tag{7}$$

We consider two versions of our RCS_i variable. The first is the standardized RCS of insurer i in 2020Q4, which allows us to utilize the most recent annual data reported prior to the reform event. The second is an indicator for whether an insurer's continuous RCS measure is below the sample median. Our coefficients of interest are now β_0 and β_2. We can now interpret β_0 as the effect of the reform on insurers with average RCS, while β_2 captures the effect of additional financial constraints. We anticipate that more constrained insurers will exhibit a stronger response to the reform, and therefore, $\beta_2 < 0$ with the con-

FIGURE 5: REGULATORY CAPITAL SURPLUS



(a) Pre-Reform RCS Distribution (2020Q4)

(b) RCS vs. Reform Exposure

Note: This figure displays the distribution of RCS (panel a) and how insurers' exposure to the reform, $\Delta \overline{f}_i$, varied with RCS in 2020Q4 (panel b).

tinuous measure and $\beta_2 > 0$ with the binary measure. All specifications include quarter and insurer fixed effects as well as log assets and return on assets controls.

We also consider a specification in which we split the sample by above- and below-median 2020Q4 RCS insurers. In these specifications, we estimate our baseline regression specification (5) separately for each of the two subsamples. We expect that β will be larger for the below-median subsample relative to the above-median subsample.

We display the results in Table 7. Across specifications, we find that $\beta_0 > 0$ as before. Importantly, we also find that $\beta_2 < 0$ ($\beta_2 > 0$ in column (2)), consistent with our hypothesis. The continuous measure interaction term is significant at the 5% level, while the binary measure is only significant at 10%. The magnitudes are large: using the continuous measure, a one-standard-deviation decline in RCS is associated with a 47.5% increase in the treatment effect relative to average RCS insurers; using the binary measure, insurers in the below-median RCS subsample have a coefficient that is 3.84 times as large as insurers in the above-median subsample. The magnitudes are similar when comparing below-median to above-median RCS insurers using the separate subsample regressions.

We also estimate a dynamic specification for (7) akin to the event study (6) using the two subsamples corresponding to columns (3) and (4) in Table 7. We display the results in Figure 6. Pre-reform effects are not statistically different from zero for either group, al-

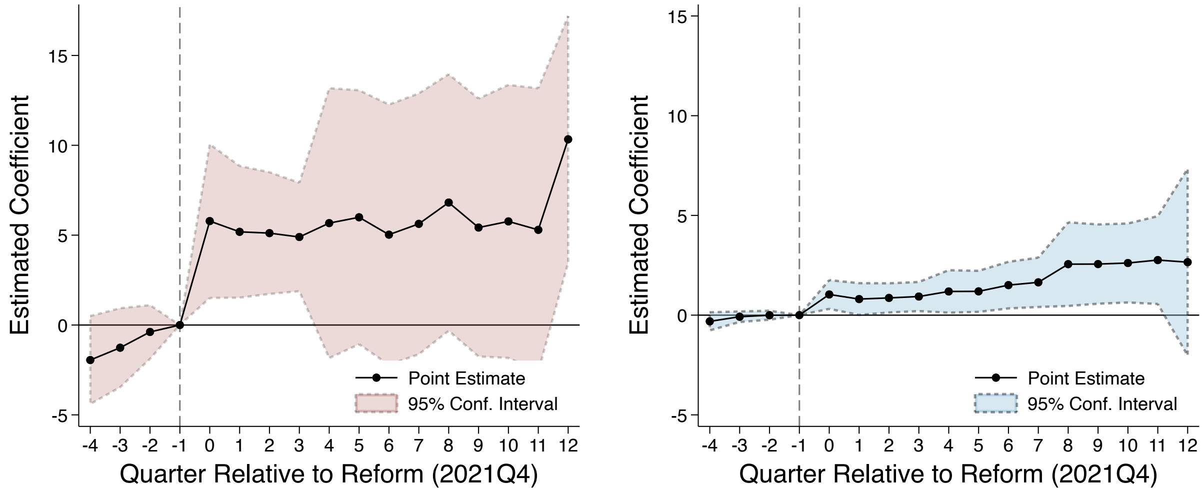
TABLE 7: FINANCIAL CONSTRAINTS AND THE EFFECTS OF THE BOND REFORM

	Dependent Variable: SharePL_{it}			
			Low RCS	High RCS
	(1)	(2)	(3)	(4)
$\Delta\bar{f}_i \times \text{Post}_t$	4.3621***	1.8234***	6.7840**	1.7687***
	(1.3816)	(0.6345)	(2.8788)	(0.6306)
$\text{RCS}_i^{\text{std}} \times \text{Post}_t$	−0.2915**			
	(0.1421)			
$\Delta\bar{f}_i \times \text{RCS}_i^{\text{std}} \times \text{Post}_t$	−2.0699**			
	(1.0512)			
$\text{LowRCS}_i \times \text{Post}_t$		0.4079		
		(0.5394)		
$\Delta\bar{f}_i \times \text{LowRCS}_i \times \text{Post}_t$		5.2570*		
		(2.9759)		
log Assets_{it}	0.8552***	0.8182***	1.6590**	0.5669**
	(0.2549)	(0.2512)	(0.6742)	(0.2854)
ROA_{it}	−0.0001	0.0000	−0.0001	−0.0002
	(0.0015)	(0.0014)	(0.0027)	(0.0013)
Quarter FE	Yes	Yes	Yes	Yes
Insurer FE	Yes	Yes	Yes	Yes
Observations	11,305	11,305	5,857	5,448
R^2	0.843	0.843	0.836	0.832
Within R^2	0.033	0.038	0.024	0.019

Note: This table reports regression estimates corresponding to equation (7). The dependent variable is insurer i's par value share of privately rated bonds in quarter t. The independent variable is an interaction between a post-reform dummy (Post_t) and the insurer's bond reform exposure, $\Delta\bar{f}_i$ as well as an interaction between Post_t and a measure of RCS as well as the triple interaction between Post_t, RCS, and the insurer's bond reform exposure. Column (1) uses the continuous and standardized RCS from 2020Q4. Column (2) uses a dummy, LowRCS_i, that is equal to 1 if insurer i's 2020Q4 RCS is below the median. Column (3) uses the baseline specification (5) conditioning on low RCS insurers. Column (4) instead conditions on high RCS insurers. Controls include log assets and return on assets. Standard errors are clustered at the insurer level and are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

though the estimates for the below-median RCS group become noisy after a year. This is in part due to the dramatic increase in private letter holdings among some of the insurers

FIGURE 6: DYNAMIC EFFECTS OF FINANCIAL CONSTRAINT HETEROGENEITY



(a) Below-median RCS

(b) Above-median RCS

Note: This figure displays the dynamic estimates corresponding to equation (6), splitting the sample between insurers that are below (panel a) and above (panel b) the median RCS in 2020Q4. Controls include log assets and return on assets. Shaded areas correspond to 95% confidence intervals. Standard errors are clustered at the insurer level.

in our sample, as we highlighted in Figure 2 of Section 3.1. To test for this, in Appendix Table A.6 and Figure A.2, we conduct our analysis on a sample that trims the top 2.5% of private letter portfolio share observations across the full sample. While doing so unsurprisingly attenuates the magnitudes of our estimates, statistical significance becomes stronger for the subsample analyses.

4.4 DOES PLR REBALANCING ATTENUATE INTENDED EFFECTS OF THE REFORM?

We have now established that the insurers most exposed to the bond reform, and especially those that are near their RBC constraints, shifted into privately rated bonds. Based on our analysis in Section 3, these bonds tend to have higher yields than other similarly (but publicly) rated bonds, and appear to have inflated ratings. These facts prompt two questions: first, based on reported ratings, did more exposed insurers rebalance their portfolios as intended by the policy? And second, if regulators took action against ratings inflation and downgraded bonds accordingly, would this attenuate the reported effects of the policy?

To study these questions, we explore how insurers' par-value-weighted ex-post risk charge changes after the policy. In particular, for each insurer, we calculate the contemporaneous charge

$$\overline{f}_{it}^{\text{ExPost}} = \frac{\sum_{j \in \mathcal{P}_{it}} \text{Par}_{ijt} \times f^{\text{post}}(s_{jt})}{\sum_{j \in \mathcal{P}_{it}} \text{Par}_{ijt}}. \quad (8)$$

where s_{jt} is bond j's letter rating. Unlike our reform measure $\Delta\overline{f}_i$, which holds portfolios fixed and varies risk charges pre- and post-reform, the contemporaneous risk charges $\overline{f}_{it}$ hold the *risk charges* fixed at the post-reform level and allow for rebalancing. We anticipate that insurers that are more exposed to the reform should rebalance more aggressively toward safer assets to relax their financial constraints. As such, we expect $\overline{f}_{it}$ to decline over time, and more so for more exposed insurers.

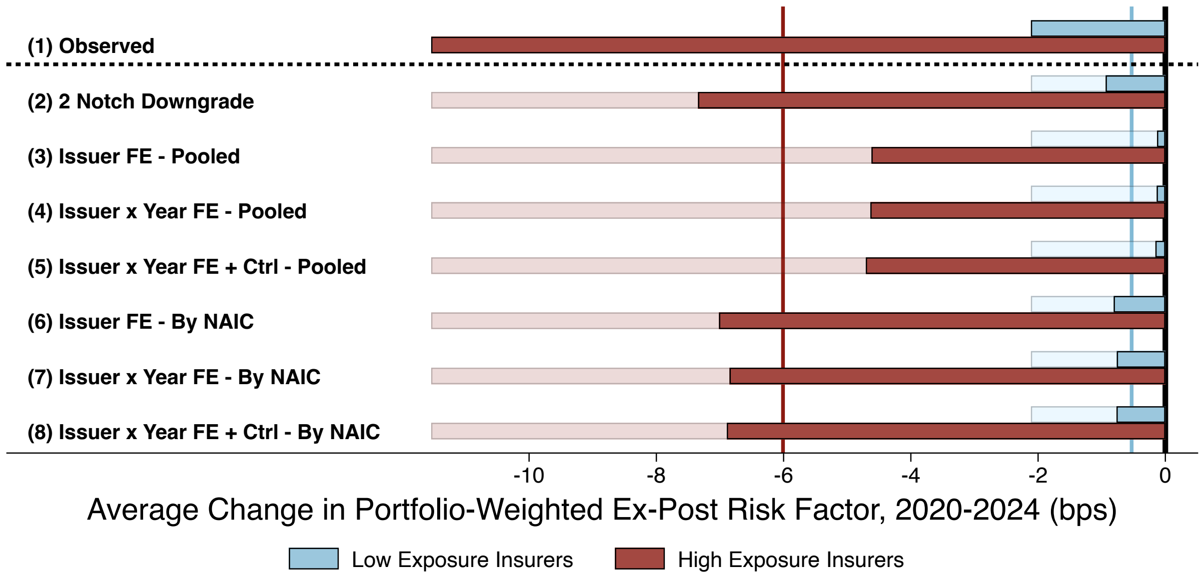
We then construct seven hypothetical risk factors that account for potential ratings inflation among privately rated bonds. We begin by naively downgrading all privately rated bonds by 2 notches, an exercise inspired by Fitch Ratings (2025). For the next three specifications, we use our regression estimates from Section 3.3 to downgrade privately rated bonds in a more systematic way. Using columns (2)-(4) of Table 4, we calculate the downgraded rating as the difference between the reported rating and the estimated $\hat{\beta}$ for each specification. For example, consider two bonds, one with a 1G classification and one with a 2C classification. The risk charges reported by insurers would be 1.02% and 2.17%, respectively. Using the results from column (2) of Table 4, the new downgraded charges would be $1.02\% - (-1.94\%) = 2.96\%$ and $2.17\% - (-1.94\%) = 4.11\%$, respectively.

For the final three specifications, we improve the validity of our estimates by separately estimating ratings inflation within each broad NAIC category (1-6), which we report in Appendix Figure A.3.[26] As before, consider the estimates corresponding to column (2) in Table 4. The figure suggests that NAIC 1 bonds are inflated by 102 bps, while NAIC 2 bonds are inflated by 111 bps. This implies that the new deflated charges of 1G bonds and 2C bonds are, respectively, $1.02\% - (-1.02\%) = 2.04\%$ and $2.17\% - (-1.11\%) = 3.28\%$.

In Figure 7, we compute the difference in risk factors (8) between 2020 and 2024 for all insurers using data from their annual filings. We then compute the mean of this difference among insurers with below and above-median reform exposure, $\overline{f}_i$. We plot the risk factor differences separately for each group and for each hypothetical downgrade scenario.

[26]Specifically, we estimate our ratings inflation regression (1) six times. For each category $c \in \{1, \ldots, 6\}$, we keep only issuers that carry (within the relevant fixed effect cell) a private letter bond of category c as well as at least one public bond of any rating. We then estimate the regression using only these issuers' privately rated bonds of category c as well as all of their publicly rated bonds. A given estimate therefore measures the average ratings inflation of category c private letter bonds relative to public bonds of firms that issue private letter bonds in category c.

Figure 7: Rebalancing Effects of the Reform with(out) Ratings Inflation



Note: This figure depicts how insurers rebalanced their bond portfolios after the RBC reform in the context of their C-1 risk factors. Each bar corresponds to the average difference in risk factors between 2020 and 2024 for a given group of insurers. There are 8 different scenarios corresponding to how privately rated bonds are deflated: scenario (1) uses risk factors reported directly by insurers; scenario (2) deflates each private rating by 2 letter notches; scenarios (3)-(5) deflate each private rating using estimates in columns (2)-(4) of Table 4; and scenarios (6)-(8) deflate each rating using estimates from Appendix Figure A.3. Red bars condition on above-median-exposure insurers, while blue bars condition on below-median-exposure insurers. The vertical lines reflect averages of scenarios (2)-(8) for each group. The sample uses information on risk charges from annual (Q4) filings.

The results when we use insurers' reported risk charges — scenario (1), the top bar in the figure — indicate that high-exposure insurers reduced their risk charges by roughly 11.5 bps relative to their implied risk charge in 2020, which is about 73% of a standard deviation of the reform exposure. Low exposure insurers also reduced their risk charges, but only by about 2.1 bps, reflecting their lower level of initial risk.

However, once we account for ratings inflation among private letter bonds, the reduction in risk charges among high-exposure insurers falls to about 6 bps on average across specifications — a 5.5 bps difference from what these insurers report in their regulatory filings. This implies that the ratings on paper overestimate the response among high-exposure insurers to the reform by about 92%. Ratings inflation also attenuates the effect of low-exposure insurers: the reduction in their risk factor is smaller in absolute terms (1.6 bps), but large in relative terms (an overstatement of about 300%).

We next test for a deterioration in reform effectiveness using our difference-in-differences framework. Specifically, we estimate the regression

$$\overline{f}_{it}^{\text{ExPost}} = \beta \,\text{Post}_t \times \Delta\overline{f}_i + \gamma' \boldsymbol{X}_{it} + \alpha_i + \delta_t + \varepsilon_{it} \tag{9}$$

We estimate a separate β coefficient using the observed risk factors as well as the seven hypothetical risk factor downgrade scenarios. To better compare to Figure 7, we also consider a specification where we replace our continuous exposure measure, $\Delta\overline{f}_i$, with an indicator for whether or not the continuous measure is above the median. As in Sections 3.3 and 3.4, we only use data from annual filings to ensure that risk factors are properly reported. Therefore, the pre-reform period consists solely of 2020.

We present the results in Figure 8. Panel (a) displays results for both the continuous treatment (in red) and the binary treatment (in blue), while panel (b) reports the effect of each downgrade scenario (2)-(8) relative to the reported risk factor scenario (1). We scale the relative effects by the magnitude of the scenario (1) estimate, which allows us to interpret the results as the degree of attenuation. The results in both specifications echo that of the raw means: although we find that more exposed insurers rebalanced toward safer assets on paper after the reform,[27] accounting for ratings inflation in all downgrade scenarios removes the statistical significance and attenuates the effect by 29.6%-53.7% (continuous treatment) and 26.8%-48.9% (binary treatment). The attenuation is significant at the 1% level in all scenarios. Overall, these results support our claim that ratings inflation eroded the effectiveness of the bond reform.

5 Spillovers to the Private Debt Market

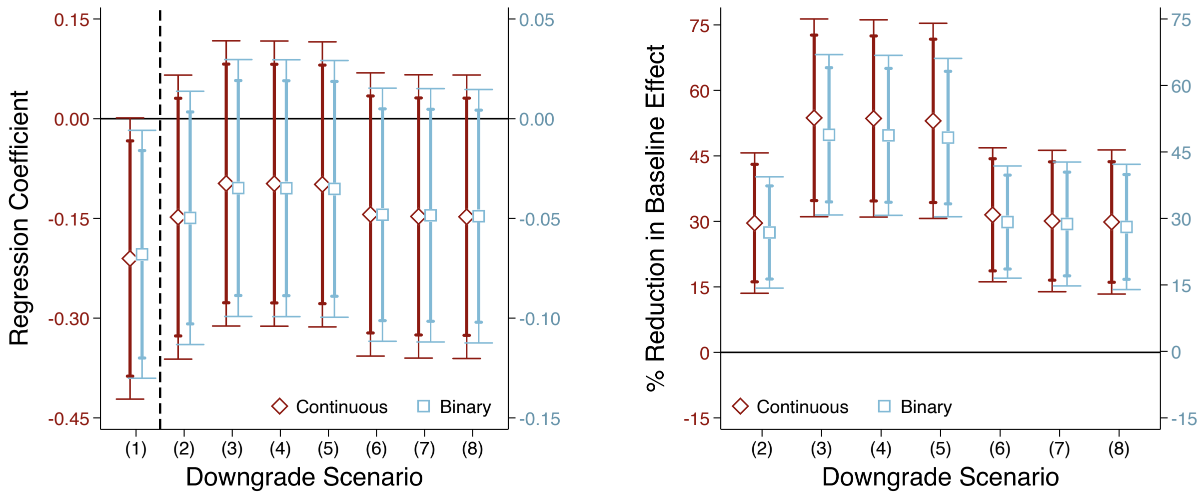
The previous section established a causal link between RBC regulation and reaching for yield through opaque private ratings. We now study a byproduct of this link: whether insurers, in an attempt to obscure the risk of their bond portfolio, inadvertently increased their demand for private assets due to their tendency to carry private ratings.

5.1 Private Debt Demand from Life Insurers

Our central hypothesis is that insurers rebalance toward opaque, privately rated bonds to avoid the additional capital charges from the bond reform. As we showed in Section 3.2, there is substantial overlap between private ratings and private placements among bonds

[27] The p-value for the continuous treatment is 0.052 and for the binary treatment is 0.032.

FIGURE 8: REBALANCING EFFECTS OF THE REFORM — REGRESSION RESULTS



(a) Regression Estimates

(b) Implied Attenuation of PLR Rebalancing

Note: This figure displays regression results corresponding to (9). Panel (a) reports the estimated coefficients using the continuous reform exposure $\Delta\overline{f}_i$ (in red, left axis) and the binary above-median reform exposure variable (in blue, right axis). Panel (b) reports the difference in the reported risk factor response (scenario 1) and the downgraded risk factor responses (scenarios 2-8), expressed as a percentage reduction in the magnitude of the effect. The deflation scenarios are as follows: scenario (1) uses risk factors reported directly by insurers; scenario (2) deflates each private rating by 2 letter notches; scenarios (3)-(5) deflate each private rating using estimates in columns (2)-(4) of Table 4; and scenarios (6)-(8) deflate each rating using estimates from Appendix Figure A.3. Controls include log assets and return on assets. Inner spikes represent 90% confidence intervals, while outer spikes represent 95% confidence intervals. Standard errors are clustered at the insurer level.

held by life insurers. In an attempt to reach for yield through private ratings, it is likely that insurers' demand for private assets would inadvertently increase as well.

However, private debt is generally less liquid than comparable public debt and, therefore, carries a liquidity premium. If insurers are reaching for yield through liquidity premia, we should expect the policy reform to also increase the share of privately placed bonds that are not necessarily privately rated. On the other hand, if publicly rated private debt does not appear to have inflated ratings relative to similar publicly rated public bonds, our central hypothesis would predict a significant effect only for privately placed bonds with a private letter rating.

To test both of these channels, we estimate our primary specification (5) using three different portfolio shares: (i) the share of bonds held with private ratings that are publicly placed; (ii) the share of bonds held with private ratings that are *privately* placed; and (iii) the share of bonds held with a *public* rating that are *privately* placed. If we only find

TABLE 8: RBC REFORM AND THE DEMAND FOR PRIVATE DEBT

	Dependent Variable: Portfolio Share		
	(1)	(2)	(3)
$\Delta \bar{f}_i \times \text{Post}_t$	2.1876***	2.5753***	1.4928
	(0.7781)	(0.7072)	(0.9745)
log Assets$_{it}$	0.0075	0.8378***	0.2092**
	(0.0919)	(0.2263)	(0.1054)
ROA$_{it}$	0.0015	−0.0013	−0.0019
	(0.0013)	(0.0009)	(0.0012)
Private Label	✓	✓	
Private Placement		✓	✓
Quarter FE	Yes	Yes	Yes
Insurer FE	Yes	Yes	Yes
Observations	11,356	11,356	11,356
R^2	0.745	0.823	0.672
Within R^2	0.010	0.016	0.002

Note: This table reports the estimation results corresponding to equation (5), splitting the dependent variable into three categories. Column (1) reports the results using portfolio shares of public debt with a private rating. Column (2) reports the results using portfolio shares of private debt with a private rating. Column (3) reports the results using portfolio shares of private debt with a public rating. Controls include log assets and return on assets. Standard errors are clustered at the insurer-level and are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

significant effects for (i) and not (iii), then the evidence is consistent with private ratings arbitrage rather than a reach for liquidity premia.

We report the results in Table 8. Our estimates support a spillover of the policy into private debt demand through ratings, and do not support liquidity premia as an alternative reaching-for-yield margin. Specifically, the coefficient on our exposure variable is positive and significant, but only for bonds that are privately labeled. The coefficient on privately placed but publicly labeled bonds is positive, but the estimates are statistically insignificant and smaller than the other specifications.

We also plot dynamic estimates in Figure 9. As before, we find no evidence of pretrends. Portfolio shares of bonds that are privately labeled — either privately or publicly placed — increase consistently over time, while portfolio shares for the publicly labeled private bonds do not have any statistically significant jumps, and the effect even reverts to near zero a few quarters after the reform.

We use our dynamic estimates to quantify the additional demand for private debt securities implicitly created by the policy reform. From our dynamic specification, for each insurer-quarter, we can recover the estimated additional demand for privately placed and privately rated debt,

$$\widehat{\text{PP-PL Demand}}_{it} = \hat{\beta}_t \times \Delta \overline{f}_i \times \text{Par}_{it}. \tag{10}$$

We then aggregate (10) across insurers in each quarter to recover an estimate of industry-level private placement demand. For periods prior to the reform, we set $\hat{\beta}_t = 0$.

We display the cumulative estimated demand in Figure 10. First, in panel (a), we report the results as quantities. At the onset of the reform in 2021Q4, demand jumped up by approximately $11.1 billion, followed by an additional $6.9 billion the following year. The increase in demand accelerated by an additional $11.2 billion in 2023Q4, and slowed to $4.1 billion in 2024Q4. The cumulative demand created by the end of our sample was about $33.3 billion.

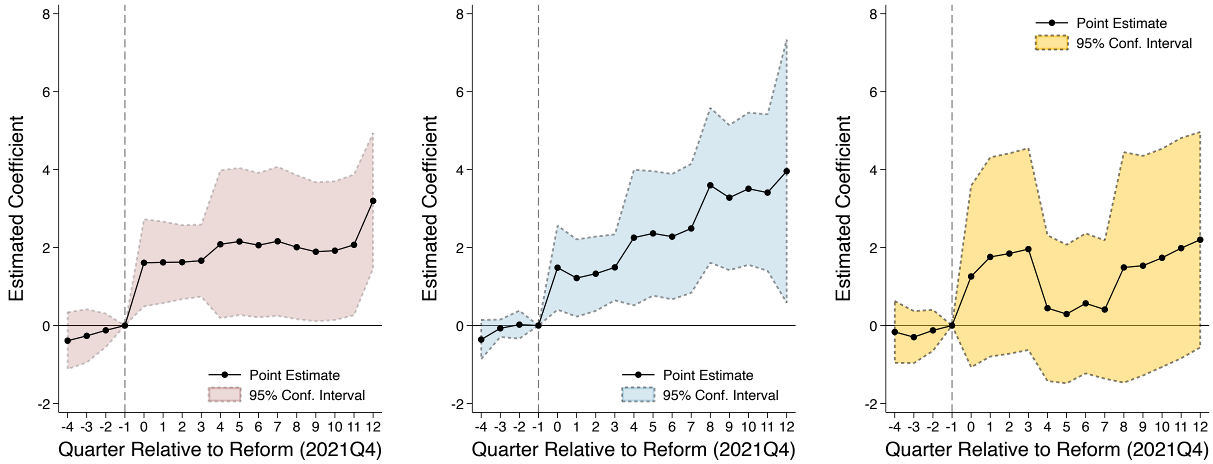
To give context to these numbers, we report how large the additional demand was relative to the privately placed and privately rated bonds on insurers' balance sheets at each point in time. Among bonds that are both privately rated and privately placed, the additional generated demand accounted for approximately 9.6% of insurers' total holdings by 2024Q4. Relative to their total holdings of private ratings, the additional demand accounted for about 8% of insurers' total holdings. Finally, relative to their holdings of all types of private placements, the additional demand accounted for about 3.8% of insurers' total holdings by 2024Q4.

5.2 Private Debt Issuance

The additional private debt demand created by the policy reform is sizable, but it is not clear ex-ante whether the additional demand simply absorbed the holdings of other financial institutions through secondary market trading or if it actually expanded the supply of private debt. This section distinguishes these competing channels, using data on the universe of bonds issued on the primary market from Refinitiv and Mergent FISD. In general, we estimate various forms of the regression

$$\text{PP Issuance}_{it} = \mathcal{F}\Big(\beta\ \text{Exposure}_i \times \text{Post}_t + \alpha_i + \delta_t + \varepsilon_{it}\Big) \tag{11}$$

FIGURE 9: DYNAMIC EFFECTS OF THE REFORM ON PRIVATE DEBT HOLDINGS



(a) Public debt, private rating (b) Private debt, private rating (c) Private debt, public rating

Note: This figure displays the dynamic coefficients corresponding to equation (6), splitting the dependent variable into three categories. Panel (a) reports the results using portfolio shares of public debt with a private rating. Panel (b) reports the results using portfolio shares of private debt with a private rating. Panel (c) reports the results using portfolio shares of private debt with a public rating. Controls include log assets and return on assets. Shaded areas represent 95% confidence intervals. Standard errors are clustered at the insurer level.

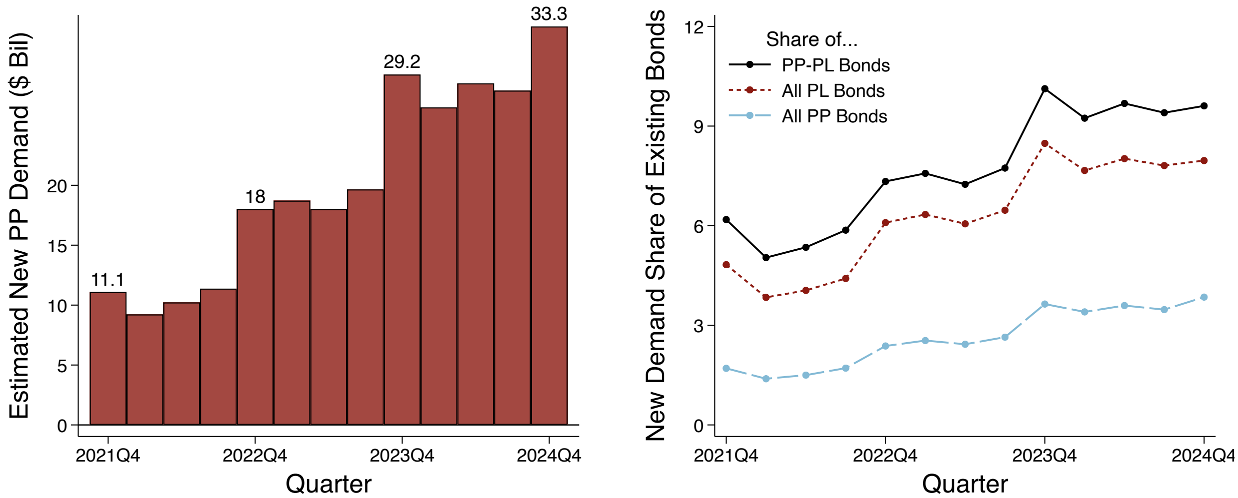
where PP Issuance$_{it}$ is an indicator equal to 1 if bond issuer i issued a privately placed bond in quarter t, and $\mathcal{F}(\cdot)$ dictates the type of model used in the estimation. We consider three models: (1) a linear probability model; (2) a Poisson regression model; and (3) a logistic regression model. We differentiate issuers by their pre-reform exposure to affected life insurers, which we define by

$$\text{Exposure}_i = \frac{\sum_{j=1}^{J} \text{Par}_{ij} \Delta \overline{f}_j}{\text{Total Par Outstanding}_i}$$

where Par$_{ij}$ denotes the total par value of issuer i's bonds held by insurer j and $\Delta \overline{f}_j$ reflects insurer j's exposure to the NAIC bond reform. If we interpret bonds held by non-insurers as carrying an exposure of 0, then our issuer-level exposure measure is a direct estimate of the total weighted exposure to the policy across all of their outstanding bonds. We standardize the exposure measure so that estimates can be interpreted as a one standard deviation change in exposure. We cluster our standard errors at the issuer level.

Table 9 reports the results. In all three specifications, we estimate a positive coefficient that is significant at the 1% level. The linear probability model implies that a one stan-

FIGURE 10: ESTIMATED DEMAND FOR PRIVATE DEBT DUE TO THE REFORM



(a) Cumulative New Demand ($Bil)

(b) Cumulative Demand Share of Holdings

Note: This figure displays the results of the counterfactual exercise described in equation (10). Panel (a) reports the estimated volume (in billions of USD) of privately placed debt demand created by the reform over time. Panel (b) reports the volume in panel (a) as a percentage of insurers' aggregate time-varying holdings of privately placed and privately rated bonds (black line), all privately rated bonds (red line), and all privately placed bonds (blue line).

dard deviation increase in issuer exposure to the bond reform leads to a 56 bps increase in the likelihood of issuing a privately placed bond in a given quarter, which is an approximately 14.3% increase over the pre-reform mean. The Poisson and logistic models yield similar estimates, which suggest that a one-standard-deviation increase in issuer exposure leads to 16.8% and 17.2% increases in the relative likelihood of issuing a privately placed bond in a given quarter after the reform. As such, the policy not only shifted risk-taking incentives, but actively led to an expansion in private debt supply.

6 CONCLUSION

This paper studies how financial regulation can redirect risk-taking toward opaque forms of credit certification. We examine the 2021 reform to U.S. life insurers' bond risk-based capital requirements, which replaced a coarse six-category schedule with a more granular twenty-category schedule. Although the reform was intended to reduce reaching for yield within public rating categories, we show that it also increased insurers' incentives to hold privately rated bonds. These bonds have become a growing share of life insurers' portfolios, appear favorably rated relative to comparable publicly rated bonds, and

TABLE 9: RBC REFORM EXPOSURE AND PRIVATE DEBT ISSUANCE

	Dependent Variable: PP Issuance$_{it}$		
	(1)	(2)	(3)
Exposure$_i$ × Post$_t$	0.0056***	0.1679***	0.1719***
	(0.0010)	(0.0464)	(0.0596)
Model	LPM	Poisson	Logit
Issuer FE	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes
Observations	75,068	25,452	25,452
R^2	0.1701		
Within R^2	0.0003		
Pseudo R^2		0.1336	0.1618
BIC		23,311.4	22,673.6

Note: This table reports the estimation results corresponding to equation (11). Column (1) corresponds to a linear probability model, column (2) corresponds to a Poisson regression model, and column (3) corresponds to a logistic regression model. Standard errors are clustered at the issuer level and are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

offer higher yields within rating categories. Together, these facts suggest that private ratings provide a capital-efficient margin through which insurers can preserve yield while limiting measured regulatory risk.

Using cross-sectional variation in insurers' exposure to the reform, we find that more exposed insurers increased their holdings of privately rated bonds after the reform, with stronger effects among insurers with lower regulatory capital surplus. This reallocation weakens the intended effect of the reform: once we adjust privately rated bonds for the ratings inflation documented in the paper, the apparent improvement in portfolio risk falls substantially. The effects also extend beyond insurers' balance sheets. The reform-induced demand shift is concentrated in privately rated debt rather than private placements, and firms more exposed to affected insurers subsequently increase private debt issuance. The broader implication is that capital regulation can shape opaque credit markets even when it does not directly target them, especially when regulatory rules allow for forms of credit ratings whose transparency and comparability vary across markets.

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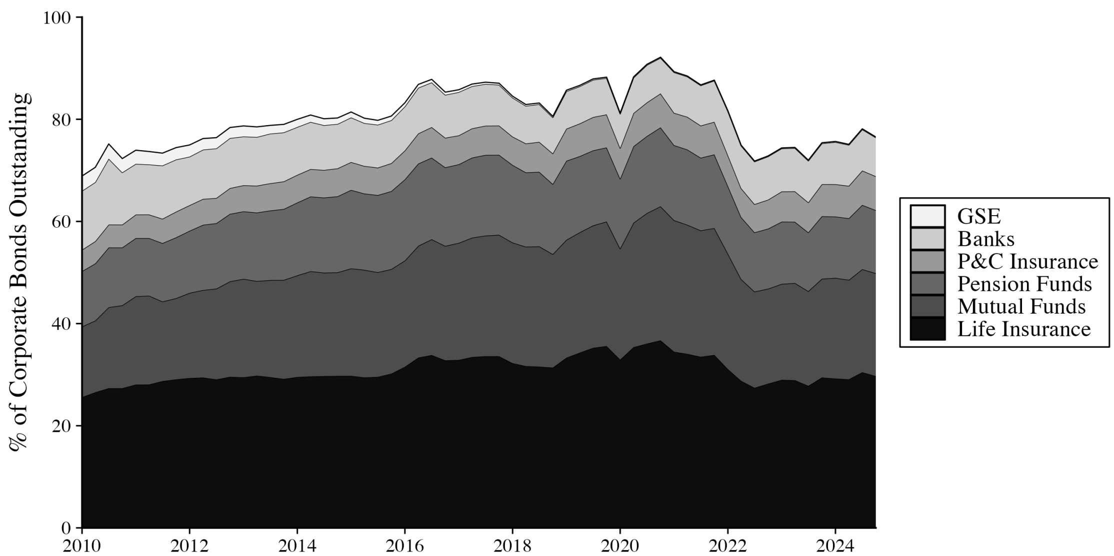
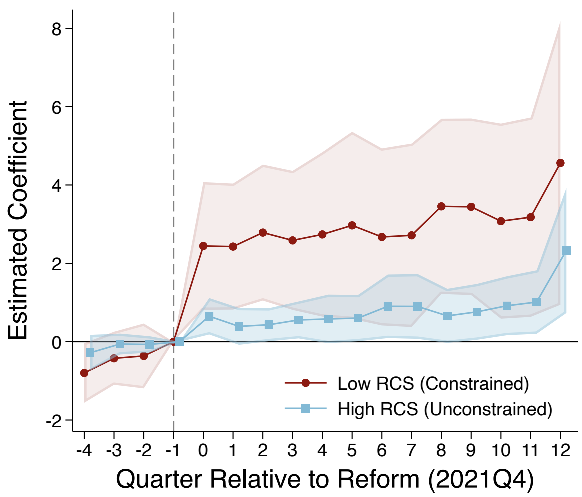
A Additional Figures and Tables

Figure A.1: Institutional investors in the bond market.

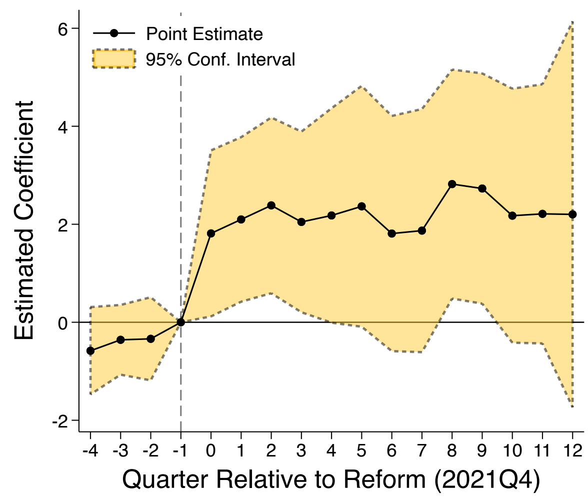


Note: This figure plots the ownership structure of the U.S. corporate and foreign bond market between 2010Q1 and 2024Q4 (excluding holdings by foreign investors). From top to bottom, the figure shows the fraction of bonds owned by government-sponsored enterprises (GSEs), depository institutions, property-casualty insurance companies, pension funds, mutual funds, and life insurance companies. The data is obtained from the Financial Accounts of the United States.

FIGURE A.2: DYNAMIC EFFECTS OF RCS HETEROGENEITY — 2.5% TRIM AT THE TOP



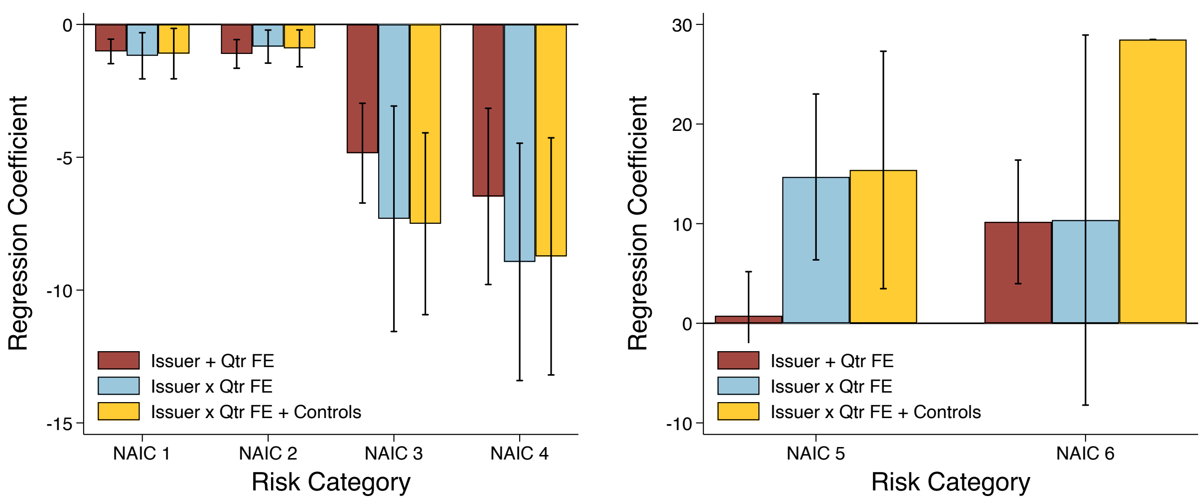
(a) Low vs. High RCS



(b) Triple Difference Term

Note: This figure displays the dynamic estimates corresponding to equation (6), splitting the sample between insurers that are below and above the median RCS in 2020Q4. Panel (a) uses different subsamples, and panel (b) plots the dynamic coefficients on the interaction term in the triple difference specification using a binary RCS variable (column 2). Controls include log assets and return on assets. Shaded areas correspond to 95% confidence intervals. The top 2.5% of dependent variable observations are removed to account for outliers. Standard errors are clustered at the insurer level.

FIGURE A.3: NAIC-SPECIFIC RATINGS INFLATION ESTIMATES



(a) NAIC 1-4

(b) NAIC 5-6

Note: This graph displays estimates from regression (1) when conditioning on the broad NAIC category of a given private letter. Panel (a) considers the effects on NAIC 1-4 bonds, while panel (b) considers the effects on NAIC 5-6 bonds. Red bars represent the specification with issuer and quarter fixed effects, blue bars represent the specification with issuer× quarter fixed effects, and yellow bars add bond-level controls. Controls are dummies for whether a bond is privately placed, senior secured, fixed interest, callable, or a structured security. Maturity buckets are three-year bins from 0 to 30 years. Spikes represent 95% confidence intervals using standard errors that are clustered at the bond level.

TABLE A.1: SVO ADMINISTRATIVE SYMBOLS: DEFINITIONS AND PAR-VALUE SHARES

Symbol	Meaning	Share of all bonds (%)	Share of PP bonds (%)
FE	Filing Exempt. The security is exempt from filing with the SVO, and the NAIC designation is assigned through the filing-exempt process. This applies to bonds and preferred stock with a current, monitored rating from an NAIC-recognized statistical rating organization (CRP).	83.73	24.05
PL	Private Letter rating. A privately disseminated NRSRO rating, reported with the PL symbol.	9.37	56.01
FM	Financially modeled NAIC designation. This applies only to structured securities, such as RMBS and CMBS. Insurers use the FM suffix for modeled RMBS/CMBS, often reported as FMR or FMC.	2.80	0.00
Z	Insurer self-designated or in transition. The designation is not derived from the SVO and must be filed within the required timeframe.	2.48	11.22
YE	Year-end carryover. The annual update has been filed but will not be designated by year-end, so the prior-year designation is carried forward.	0.61	4.23
IF	Initial Filing. The security has been properly filed with the SVO but has not received an NAIC designation by year-end. The insurer self-designates for year-end reporting and flags the security as IF.	0.30	2.01
*	Asterisk administrative marker. This marker is limited to NAIC Designation 6 and is therefore only valid in combination with NAIC 6.	0.27	0.26
GI	General Interrogatory. This indicates that the insurer must provide additional disclosure and justification to regulators for holding the security.	0.22	1.15
PLGI	Private Letter Rating–General Interrogatory.	0.07	0.10
RTIF	Regulatory Transaction–Initial Filing Submitted to SVO. The RT flag identifies complex, non-standard instruments that require case-by-case regulatory judgment because they cannot be reliably designated using CRP ratings or financial modelling.	0.06	0.48
RTS	Regulatory Transaction–SVO Reviewed.	0.05	0.37

Notes: The table reports definitions of the most prevalent SVO administrative symbols and respective par-value shares of all bonds and privately placed (PP) bonds in our sample.

TABLE A.2: RATINGS INFLATION REGRESSION RESULTS — TIME-VARYING CONTROLS

	Dependent Variable: Risk Factor_{ibt}				
Model:	(1)	(2)	(3)	(4)	(5)
Private Rating	0.6890***	-3.155***	-3.893***	-2.027***	-2.242***
	(0.0726)	(0.1810)	(0.2958)	(0.4436)	(0.1818)
Privately Placed				0.4265	
				(0.3316)	
Secured				-0.6046***	
				(0.0561)	
Fixed Rate				-0.5058***	
				(0.1483)	
Callable				0.0331	
				(0.0324)	
Structured Security				-0.4621***	
				(0.1050)	
Year FE	Yes	Yes			Yes
Maturity bin FE	Yes	Yes	Yes	Yes	Yes
Issuer FE		Yes			
Issuer × Year FE			Yes	Yes	
Bond FE					Yes
Observations	434,411	426,154	364,006	189,173	385,778
R^2	0.04232	0.70588	0.68172	0.66471	0.90654
Within R^2	0.00130	0.01046	0.00832	0.00943	0.01191

Note: This table reports regression estimates corresponding to equation (1). The dependent variable is a bond's risk factor in year t, and the primary independent variable is an indicator for whether at least one insurer marks bond b as privately labeled. Column (1) includes year and maturity bin fixed effects. Column (2) adds issuer fixed effects. Column (3) replaces the year and issuer fixed effects with issuer × year fixed effects. Column (4) adds bond-level controls. Column (5) replaces the issuer × year fixed effect with a year and bond fixed effect. Controls are dummies for whether a bond is privately placed, senior secured, fixed interest, callable, or a structured security. Maturity buckets are three-year bins from 0 to 30 years. The sample conditions consistent ratings designations across insurers, and allows for time-varying controls due to restructuring. Standard errors are clustered at the bond level and are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

TABLE A.3: RATINGS INFLATION REGRESSION RESULTS — FULL SAMPLE

	Dependent Variable: Risk Factor_{ibt}				
Model:	(1)	(2)	(3)	(4)	(5)
Private Rating	0.7311***	-3.044***	-3.766***	-1.972***	-2.202***
	(0.0733)	(0.1662)	(0.2699)	(0.4088)	(0.1642)
Privately Placed				0.4930	
				(0.3256)	
Secured				-0.6178***	
				(0.0555)	
Fixed Rate				-0.4751***	
				(0.1428)	
Callable				0.0348	
				(0.0317)	
Structured Security				-0.4985***	
				(0.1180)	
Year FE	Yes	Yes			Yes
Maturity bin FE	Yes	Yes	Yes	Yes	Yes
Issuer FE		Yes			
Issuer × Year FE			Yes	Yes	
Bond FE					Yes
Observations	460,133	452,060	389,137	199,495	411,535
R^2	0.04067	0.70030	0.67997	0.66123	0.89939
Within R^2	0.00145	0.01019	0.00828	0.00947	0.01165

Note: This table reports regression estimates corresponding to equation (1). The dependent variable is a bond's risk factor in year t, and the primary independent variable is an indicator for whether at least one insurer marks bond b as privately labeled. Column (1) includes year and maturity bin fixed effects. Column (2) adds issuer fixed effects. Column (3) replaces the year and issuer fixed effects with issuer × year fixed effects. Column (4) adds bond-level controls. Column (5) replaces the issuer × year fixed effect with a year and bond fixed effect. Controls are dummies for whether a bond is privately placed, senior secured, fixed interest, callable, or a structured security. Maturity buckets are three-year bins from 0 to 30 years. The sample allows for inconsistent ratings reported across insurers and allows for time-varying control variables due to restructuring. Standard errors are clustered at the bond level and are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.4: Sample coverage across restrictions and specifications

Specification	**Observations**	**Unique CUSIPs**	**Unique issuers**
Panel A: Full sample (rating disagreements allowed, time-varying controls)			
(1) Year, Maturity bin FE	460,133	159,514	46,805
(2) Year, Maturity bin, Issuer FE	452,060	151,441	38,732
(3) Issuer×Year, Maturity bin FE	389,137	135,142	24,347
(4) Issuer×Year, Maturity bin FE + controls	199,495	73,239	14,431
(5) Bond, Year, Maturity bin FE	411,535	110,916	34,520
Panel B: Rating agreement (all holding insurers agree on the rating)			
(1) Year, Maturity bin FE	434,411	155,525	46,450
(2) Year, Maturity bin, Issuer FE	426,154	147,268	38,193
(3) Issuer×Year, Maturity bin FE	364,006	130,762	23,888
(4) Issuer×Year, Maturity bin FE + controls	189,173	71,063	14,150
(5) Bond, Year, Maturity bin FE	385,778	106,892	33,978
Panel C: Rating agreement + stable characteristics (baseline)			
(1) Year, Maturity bin FE	236,358	81,010	25,415
(2) Year, Maturity bin, Issuer FE	232,718	77,370	21,775
(3) Issuer×Year, Maturity bin FE	195,741	68,146	13,816
(4) Issuer×Year, Maturity bin FE + controls	176,656	67,421	13,625
(5) Bond, Year, Maturity bin FE	213,187	57,839	19,599

Notes: The table reports the coverage of the estimation samples underlying the risk-factor regressions, broken down by sample restriction (Panels A–C) and specification (columns (1)–(5)). *Observations* is the number of insurer–bond–year observations; *Unique CUSIPs* and *Unique issuers* count the distinct bonds and bond issuers entering each estimation. Panel A is the full sample, allowing for rating disagreements across insurers and time-varying bond characteristics (Appendix Table A.3). Panel B additionally restricts to bonds on which all holding insurers agree on the reported rating (Appendix Table A.2). Panel C is the baseline sample, which further excludes bonds whose characteristics change over time (Table 4). The specifications mirror columns (1)–(5) of the risk-factor regression tables.

TABLE A.5: PUBLIC BONDS WITH PLRS HAVE HIGHER YIELDS — WRDS SAMPLE

	Dependent Variable: Yield_{ibt}			
	(1)	(2)	(3)	(4)
Private Rating	2.656***	2.952***	2.712***	0.2763
	(0.2224)	(0.2100)	(0.2800)	(0.2574)
Secured			0.2096***	-0.8422***
			(0.0611)	(0.2816)
Fixed Rate			0.2653	0.1885**
			(0.2312)	(0.0789)
Callable			-0.0586	-0.0626
			(0.0475)	(0.0392)
Structured Security			0.9939***	
			(0.1268)	
Year FE	Yes			
Rating × Year FE		Yes	Yes	
Issuer × Year FE				Yes
Maturity FE	Yes	Yes	Yes	Yes
Observations	43,551	43,549	29,742	28,042
R^2	0.33188	0.53627	0.65361	0.88551
Within R^2	0.00244	0.00436	0.00527	0.00121

Note: This table reports regression estimates corresponding to equation (2). The dependent variable is the market yield of bond b in year t, and the primary independent variable is an indicator for whether at least one insurer marks bond b as privately labeled. Column (1) adds year and maturity-bucket fixed effects; column (2) replaces the year FE with rating × year FE. Column (3) adds bond-level controls. Column (4) replaces the rating × year fixed effect with an issuer × year fixed effect. Controls are dummies for whether a bond is a senior secured, fixed-interest, callable, or structured security. Maturity buckets are three-year bins from 0 to 30 years. Standard errors are clustered at the bond level and are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

TABLE A.6: RCS AND THE EFFECTS OF THE BOND REFORM — 2.5% TRIM AT THE TOP

	Dependent Variable: SharePL_{it}			
			Low RCS	High RCS
	(1)	(2)	(3)	(4)
$\Delta\bar{f}_i \times \text{Post}_t$	2.0518***	0.9258***	3.3697***	0.9040***
	(0.5183)	(0.3301)	(0.9905)	(0.3308)
$\text{RCS}_i^{\text{std}} \times \text{Post}_t$	−0.2599***			
	(0.0618)			
$\Delta\bar{f}_i \times \text{RCS}_i^{\text{std}} \times \text{Post}_t$	−0.9326*			
	(0.5394)			
$\text{LowRCS}_i \times \text{Post}_t$		0.4227**		
		(0.1852)		
$\Delta\bar{f}_i \times \text{LowRCS}_i \times \text{Post}_t$		2.5397**		
		(1.0451)		
$\log \text{Assets}_{it}$	0.4917***	0.4716***	0.8969**	0.3640**
	(0.1596)	(0.1579)	(0.3918)	(0.1778)
ROA_{it}	−0.0009	−0.0008	−0.0010	−0.0005
	(0.0009)	(0.0009)	(0.0014)	(0.0011)
Quarter FE	Yes	Yes	Yes	Yes
Insurer FE	Yes	Yes	Yes	Yes
Observations	11,010	11,010	5,622	5,388
R^2	0.870	0.871	0.844	0.903
Within R^2	0.042	0.049	0.024	0.027

Note: This table reports regression estimates corresponding to equation (7) in which the top 2.5% of the dependent variable observations are trimmed. The dependent variable is insurer i's par value share of privately rated bonds in quarter t. The independent variable is an interaction between a post-reform dummy (Post_t) and the insurer's bond reform exposure, $\Delta\overline{f}_i$ as well as an interaction between Post_t and a measure of RCS as well as the triple interaction between Post_t, RCS, and the insurer's bond reform exposure. Column (1) uses the continuous and standardized RCS from 2020Q4. Column (2) uses a dummy, LowRCS_i, that is equal to 1 if insurer i's 2020Q4 RCS is below the median. Column (3) uses the baseline specification (5) conditioning on low RCS insurers. Column (4) instead conditions on high RCS insurers. Controls include log assets and return on assets. Standard errors are clustered at the insurer level and are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.