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Abstract

Inflation risk explains a significant share of the systematic residual variation in yield spread changes beyond credit factors and intermediation frictions. Movements in expected inflation directly affect the real value of debt and, consequently, bond prices. I show that shocks to inflation expectations, volatility, and cyclicality – derived from inflation swap prices – are important determinants of yield spread movements. Load-ing patterns become more pronounced with higher ex-ante default risk and cash-flow flexibility but weaken with refinancing intensity. To rationalize the findings, I show that the same patterns emerge in a model of debt rollover risk with stochastic inflation and sticky cash flows.

Keywords: inflation risk, corporate bonds, yield spread changes, inflation-linked derivatives.

JEL classification: G10, G12, G20.

Resumen

El riesgo de inflación explica una parte importante de los movimientos sistemáticos en los diferenciales de rendimiento de los bonos corporativos que no se deben a riesgos crediticios o de intermediación. Los cambios en la inflación esperada reducen el valor real de la deuda y, por tanto, bajan los precios de los bonos. Este estudio demuestra que los movimientos en las expectativas de inflación, su volatilidad y su sensibilidad al ciclo económico —medidas con precios de *swap* de inflación— impulsan estos movimientos en los diferenciales. Estos efectos son más fuertes en las empresas con alto riesgo de crédito y flujos de caja flexibles, pero se atenúan con los refinanciamientos frecuentes. Para respaldar estos resultados, un modelo de riesgo de crédito con renovación de deuda, inflación estocástica y flujos de caja rígidos genera movimientos similares.

Palabras clave: riesgo de inflación, diferenciales de rendimiento, expectativas de inflación, riesgo crediticio, bonos corporativos.

Códigos JEL: G10, G12, G20.

I. Introduction

Corporate yield spread changes remain empirically challenging to explain. Collin-Dufresne, Goldstein and Martin (2001) (hereafter CDGM) show that fundamental credit risk variables play a significant role, yet a substantial amount of unexplained variation persists. Much of this unexplained systematic variation is tied to a common component, suggesting the presence of potential unidentified factors alongside standard credit risk variables. Given the predominance of nominal debt in the U.S. corporate sector and the stickiness of firms' leverage, even modest increases in inflation directly reduce the real value of liabilities, lowering default risk and compressing credit spreads – especially for highly leveraged firms. Yet this channel remains largely overlooked in standard explanations of corporate bond pricing.

In this paper, I investigate the ability of inflation risk to explain the large systematic unexplained variation in yield spread changes. I define inflation risk as a combination of three distinct proxies, measured using cash-flow-matched inflation swap rates: (1) innovations in expected inflation, which capture nominal rigidities associated with long-term nominal debt, (2) inflation uncertainty, which reflects cash-flow volatility due to price uncertainty, and (3) inflation cyclicality, which captures state-dependent effects of inflation through the correlation between inflation and real asset growth. In yield spread changes regressions, these proxies account for more than a quarter of the unexplained systematic variation in yield spreads, beyond standard credit risk and intermediation factors, and explain a significant portion of the common residual component.

Building on prior studies that show inflation impacts firm outcomes and aggregate credit spreads, with an emphasis on broad market dynamics (e.g., David (2008); Kang and Pflueger (2015); Bhamra, Dorion, Jeanneret and Weber (2022)), I advance this literature by identifying the channels through which inflation risk transmits to yield spreads and by introducing and quantifying novel market-based measures that capture the common component of yield spread changes. A theoretical model links inflation risk to yield spreads through nominal frictions in liabilities and cash flows: rising expected inflation reduces the real value of debt, lowering default probabilities and narrowing credit spreads; inflation uncertainty raises cash flow volatility and widens spreads; and inflation cyclicality intensifies default risk during low-inflation recessions, as elevated real debt burdens and weaker repayment capacity further widen spreads.[1] These effects arise from nominal frictions: when leverage is sticky and cash flows are flexible, firms' limited balance sheet flexibility increases their sensitivity to inflation risk, leading to larger changes in default risk and yield spreads.

I construct inflation risk proxies using zero-coupon inflation swaps—forward contracts in which the inflation buyer pays a predetermined fixed nominal rate and receives an inflation-linked payment from the seller. Zero-coupon inflation swaps are among the most liquid over-the-counter (OTC) inflation-linked derivatives, and together with nominal Treasuries, provide an alternative measure of real yields (e.g., Fleming and Sporn (2013); Fleckenstein, Longstaff and Lustig (2016); Diercks, Campbell, Sharpe and Soques (2023)).[2] Because these swaps reflect market contracts based on inflation views, they directly connect asset prices—with longer-duration cash flows—to market participants' inflation expectations. To account for variation in bond durations, I match each bond's duration to the corresponding swap maturity, using the swap rates as proxies for expected inflation and as the basis for constructing inflation risk proxies.

I begin the empirical analysis by showing that the unexplained variation in yield spread changes, along with its significant residual commonality, persists in the most recent U.S. corporate bond market data. Consistent with prior studies (see, e.g., CDGM, Friewald and Nagler (2019); He, Khorrami and Song (2022); Eisfeldt, Herskovic and Liu (2024)), standard credit risk variables only explain a limited portion of yield spread movements, with a mean adjusted R^2 of 35.4% in time-series regressions. Using principal component analysis (PCA), I confirm that the regression residuals remain highly cross-correlated: the first principal component accounts for 79.4% of systematic residual variation, highlighting a significant

[1] Chen (2010) and Bhamra, Dorion, Jeanneret and Weber (2022) also note that recovery rates tend to be lower in low-inflation economic states.

[2] See Christensen, Lopez and Rudebusch (2016) and Fleckenstein, Longstaff and Lustig (2017) for applications of inflation swaps and options in studying deflation risk.

common factor not captured by credit proxies.

I document three main empirical results. First, in panel regressions, inflation risk proxies are significantly related to yield spread changes. Innovations in expected inflation, proxied by changes in inflation swap rates, explain 19.8% of the systematic variation in residuals, while inflation uncertainty, measured as the monthly standard deviation of the inflation swap rate, accounts for 18%. Inflation cyclicality, captured using the stock–bond return correlation – which proxies for the correlation between inflation and real growth (e.g., Campbell, Pflueger and Viceira (2020); Fang, Liu and Roussanov (2025); Bonelli, Palazzo and Yamarthy (2025)) has a smaller effect, explaining 4% of systematic residual variation.[3] Together, these three variables account for 36.8% of the unexplained systematic variation in yield spread changes. The results are robust to various controls: in the most stringent specification, inflation risk still explains 26.7% of residual systematic variation after accounting for CDGM, intermediary factors from He, Khorrami and Song (2022) and Eisfeldt, Herskovic and Liu (2024), and OTC frictions from Friewald and Nagler (2019). Moreover, the economic impact is also meaningful: a one standard deviation increase in expected inflation narrows yield spreads by 8.9 basis points, nearly matching the impact of a comparable change in the 10-year Treasury rate, while inflation uncertainty and cyclicality increase spreads by 5.4 and 1.1 basis points, respectively. These findings show the prominent role of inflation risk beyond standard credit proxies and intermediation channels.

Second, inflation risk accounts for a significant fraction of the common component in residuals from regressions of yield spread changes on credit risk variables. Consistent with CDGM and recent data, these residuals are highly cross-correlated, with most of their systematic variation captured by the first principal component – a systematic factor that standard credit risk variables cannot explain and is central to understanding bond pricing dynamics. When the common component is regressed on inflation risk proxies, inflation risk accounts for 21.5%

[3] A similar alternative measure based on the correlation between estimated asset and expected inflation innovations yields comparable results. While this measure is much noisier because firm assets must be estimated each month, it aligns more closely with the model.

of its variation and continues to exhibit strong explanatory power even after controlling for intermediation factors. This finding complements earlier results by isolating inflation risk's structural role in driving the common factor.

Third, I document large heterogeneous effects consistent with the nominal friction channel. The impact of inflation risk is more pronounced for firms with high leverage or low credit ratings, supporting a default risk channel where riskier firms benefit more from debt deflation. Firms with distant refinancing needs are also more sensitive to inflation risk, as they face higher default risk (e.g., Friewald, Nagler and Wagner (2022)) and less immediate pressure to adjust coupon payments. A related pass-through channel emerges when examining firms' cash-flow structures. Firms with floating-rate debt are less impacted, as their coupon payments automatically adjust to interest rates. In contrast, firms with flexible cash flows show greater sensitivity to inflation risk, as higher pass-through from inflation to cash flows increases their exposure. These findings highlight two channels through which inflation risk affects firms. First, the default risk channel: highly leveraged or lower-rated firms benefit more from debt deflation as expected inflation reduces the real value of liabilities. Second, the pass-through channel: when leverage is sticky but cash flows adjust flexibly, firms with greater revenue pass-through or inflexible coupon payments become more sensitive to inflation risk.

To rationalize these patterns, I develop a debt rollover model with stochastic inflation and sticky cash flows, which captures the principal empirical regularities. In the model, rising expected inflation reduces the real value of nominal liabilities, lowering default risk and narrowing yield spreads—a relationship driven by the stickiness of leverage, as leverage does not adjust fully with inflation expectations. In contrast, inflation uncertainty heightens asset volatility, raising default probabilities and widening spreads. The correlation between inflation and real asset innovations reflects the cyclicality of inflation: when low inflation coincides with weak real assets, real leverage rises and default risk is amplified. In line with the empirical evidence, the model predicts stronger effects of inflation risk for firms with higher default risk and more flexible cash flow structures.

In additional tests, I show that the results are robust to a wide range of inflation-related controls, including unemployment, real consumption, income, and monetary policy proxies. I further verify that the findings are not driven by the construction of the inflation proxies—whether based on swaps, TIPS, or CPI forecasts that are free of risk premia concerns – nor by alternative methods of aggregating regression residuals. Extending the sample through 2024 using TRACE Enhanced data encompasses both the low-inflation environment of the 2010s and the post-pandemic inflationary surge that preceded the Fed's aggressive tightening cycle. Despite these different macroeconomic conditions, the documented relationships remain consistent, with inflation risk proxies explaining a large part of yield spread variation and maintaining similar coefficient magnitudes and signs. This persistence across varying inflation regimes suggests that the pricing of inflation risk in corporate bonds reflects systematic economic relationships rather than artifacts of specific market conditions. Across all specifications, inflation risk continues to exert significant explanatory power, confirming that inflation expectations, uncertainty, and cyclicality remain important drivers of corporate bond spreads.

This paper contributes to the empirical literature linking inflation to asset prices. While the role of inflation risk is well established in equity markets (see, e.g., Fama (1981); Chen, Roll and Ross (1986); Weber (2014); Eraker, Shaliastovich and Wang (2016); Fleckenstein, Longstaff and Lustig (2017); Boons, Duarte, de Roon and Szymanowska (2020)), evidence on corporate credit remains more limited. Prior studies document that inflation affects firm outcomes and aggregate credit spreads, often through debt-deflation mechanisms. For example, Kang and Pflueger (2015) show that inflation volatility and cyclicality raise aggregate spreads across developed economies, consistent with concerns about debt deflation in low-inflation states. David (2008) highlights inflation uncertainty as a driver of the credit spread puzzle, while Gomes, Jermann and Schmid (2016) and Bhamra, Dorion, Jeanneret and Weber (2022) develop structural models of sticky leverage, where nominal long-term debt amplifies financial frictions. More recently, Ceballos (2021) documents a negative inflation volatility risk premium in the cross-section of corporate bond returns, and Lu, Nozawa and Song (2025) documents that while bond excess returns exhibit negative inflation betas, credit excess returns relative to duration-matched Treasuries display consistently positive betas.

While these studies establish important links between inflation and credit markets, they provide limited insight into the firm-level mechanisms through which these effects operate and lack theory-based measures that can directly capture them. This paper addresses these gaps and makes several contributions. First, rather than focusing on spread levels or aggregate indices, I examine bond level yield spread changes, addressing the longstanding puzzle of unexplained common variation in spread changes documented by CDGM, and linking their systematic residual variation to expected inflation risk. Second, I employ market-based inflation swaps to construct proxies for expectations, uncertainty, and cyclicality. By doing so, I shift the emphasis from past realized inflation to inflation expectations, offering a forward-looking understanding of how these expectations drive corporate credit markets, where yields are inherently determined by expectations. Finally, I exploit cross-sectional variation in the U.S. corporate bond market to identify two distinct transmission channels: a default risk channel, stronger for highly leveraged or low-rated firms, and a pass-through channel, which reflects the interaction of sticky leverage with differences in firms' cash-flow flexibility. This micro-level evidence provides direct insight on the transmission of inflation risk across heterogeneous firms, extending prior research that predominantly focused on aggregate relationships. By linking these empirical patterns to structural credit models, I emphasize the critical and previously underexamined role of forward-looking inflation expectations in shaping corporate credit risk.

The remainder of the paper is organized as follows. Section II outlines the data sources. Section III introduces the inflation risk proxies and presents the main results. Section IV discusses the heterogeneity results, while Section V provides additional evidence. Section

VI introduces the model explaining the qualitative relationships between yield spreads and inflation risk and Section VII concludes the paper.

II. Data

I rely on several data sources to analyze the impact of inflation risk on yield spread changes. The sample of corporate bond transactions comes from the Academic Trade Reporting and Compliance Engine (TRACE) maintained by the Financial Industry Regulatory Authority (FINRA). I follow the cleaning steps from Dick-Nielsen and Poulsen (2019), thus cleaning same-day corrections and cancellations, removing reversals, as well as double counting of agency trades. Then, I apply a median filter and a reversal filter to eliminate further potential data errors following Edwards, Harris and Piwowar (2007). The median filter identifies potential outliers in reported prices within a specific time period, while the reversal filter captures unusual price movements.[4] The sample period is September 2004 to December 2021, while in the robustness section I extend the analysis using data from the Enhanced TRACE database through December 2024.[5] I merge corporate bond pricing data from the Mergent Fixed Income Securities Database (FISD) to obtain bond characteristics, such as offering amount, offering date, maturity, coupon rate, bond rating, bond option features, and issuer information, as well as firm characteristics from CRSP/Compustat data.[6]

Following the literature on corporate bonds, I restrict the sample to corporate debentures and exclude bonds with variable coupons, convertibility, putability, asset-backed status, exchangeability, private placements, perpetual terms, preferred securities, secured lease obligations, being unrated, or quoted in a foreign currency. I also remove bonds issued by

[4]The median filter eliminates any transaction where the price deviates by more than 10% from the daily median or from a nine-trading-day median centered at the trading day. The reversal filter eliminates any transaction with an absolute price change that deviates from the lead, lag, and average lead/lag price change by at least 10%.

[5]The main sample extends through December 2021 because the Enhanced TRACE database lacks dealer identifiers and does not permit calculation of certain OTC market proxies.

[6]See the Appendix for detailed construction of TRACE/CRSP merging table.

financial firms (Standard Industrial Classification, or SIC, codes 6000 - 6999) or utility firms (SIC codes 4900 - 4999) and bonds with issue sizes under \$10 million or a time to maturity of more than 30 years or less than one month.[7]

Following CDGM, I obtain market and firm-specific variables that, according to structural models, determine yield spread changes. In particular, I obtain market variables such as the Standard & Poor's (S&P) 500 index (RM_t) from the Center for Research in Security Prices (CRSP), the VIX volatility index (ΔVIX_t) from the Chicago Board Options Exchange, and the Treasury constant maturity rates (ΔRF_t, ΔRF_t^2 and $\Delta Slope_t$) from daily off-the-run yield curves constructed by Gürkaynak, Sack and Wright (2007). As a systematic proxy for the probability or magnitude of a downward jump in firm value ($\Delta Jump_t$), I construct a measure based on at- and out-of-the-money put options and at- and in-the-money call options with maturities of less than one year, traded on the SPX index. The option data come from OptionMetrics and Options Price Reporting Authority (OPRA). For the exact procedure for estimating the jump component, I refer to CDGM. I use market leverage as a proxy for firm creditworthiness. Market leverage ($\Delta Lev_{i,t}$) is defined following Friewald and Nagler (2019) as book debt over the sum of book debt and the market value of equity, where book debt is given by the sum of Compustat items Long-Term Debt - Total (DLTT) and Debt in Current Liabilities - Total (DLC). To account for varying time lags between a firm's fiscal year-end and the information becoming publicly available, I apply a conservative lag of six months before updating a firm's debt-related information. The market value of equity is the number of common shares outstanding times the share price, both obtained from CRSP.

Inflation risk proxies are derived from inflation swap rates. I obtain daily bid and ask quotes for the inflation swap from Bloomberg for annual maturities of 1 to 10 years, as well as for 12, 15, 20, and 30-year maturities, from July 2004.[8] In the robustness section,

[7]The results remain robust when all bonds, irrespective of industry or bond type, are included, as detailed in the Internet Appendix.

[8]Bloomberg does not retain inflation swap quotes prior to July 23, 2004, even though trading began earlier. The 1- to 10-year swap maturities started trading in April 2003; the 12, 15, and 20-year inflation swap rates started in November 2003; and the 30-year inflation swap rates started in March 2004. I disregard other maturities as deemed illiquid and their quotes appear to be stale.

I compute inflation risk proxies from Treasury Inflation Protected Securities (TIPS). Zero-coupon TIPS yields and break-even rates are obtained from Gürkaynak, Sack and Wright (2010), which derive them from TIPS coupon bond yields, for annual maturities from 2 to 19 years. Since both inflation swaps and TIPS are indexed to the seasonally unadjusted Consumer Price Index (CPI-U), I adjust their rates following Fleckenstein, Longstaff and Lustig (2014). I first estimate seasonal weightings for the CPI-U for each month of the year by regressing the CPI-U index values for the January 1980 to December 2021 period on monthly indicator variables. The estimated weights are normalized to ensure that there is no seasonal effect for full-year swaps (TIPS) rates and then used to adjust the interpolated inflation swap (TIPS) curve.[9] I then match the cash flow structure of each bond and obtain cash-flow matched swap (TIPS) rates by performing a spline interpolation between provided maturities whenever necessary and use the cash-flow matched rates to compute the inflation risk proxies. I create the cyclicality proxy, as the change in rolling three-month correlation between the 10-year Treasury and S&P 500 returns.

Lastly, Producer Price Index (PPI) and input-output tables, used to estimate cash-flow flexibility, come from the U.S. Bureau of Labor Statistics, while data on realized inflation, unemployment, real consumption and income data come from the Federal Reserve Bank of St. Louis. I construct intermediation proxies using the intraday Academic TRACE data following Friewald and Nagler (2019) and Eisfeldt, Herskovic and Liu (2024). To construct the distress factor of He, Khorrami and Song (2022), I use the intermediary capital ratio from Zighuo He website and noise measure from Jun Pan website. For the exact procedures, I refer to Friewald and Nagler (2019), He, Khorrami and Song (2022) and Eisfeldt, Herskovic and Liu (2024).

The main variable in the empirical analysis is the yield spread. Using TRACE intraday data, I first eliminate transactions with when-issued, lock-in, special trades, or primary

[9] I begin the seasonal adjustment with the shortest available maturity, hence 1-year for the zero-coupon inflation swap rates and 2-years for the TIPS break-even rates. I detail the full procedure in the Internet Appendix.

trades flags. Then, I calculate the daily clean price as the volume-weighted average of intraday prices to minimize the effect of bid-ask spreads in prices, following Bessembinder, Kahle, Maxwell and Xu (2009). I consider the observation closest to the last trading day of the month, within a five-day trading window, as the month-end observation.[10] I compute the end-of-month corporate bond yield from the volume-weighted price and define the yield spread as the difference between the bond yield and the yield of a risk-free bond with the same cash-flow structure as the corporate bond. I use the U.S. Treasury yield curve estimates obtained from the Federal Reserve Board as the risk-free benchmark.[11] Next, I compute the monthly changes and returns of all variables. To avoid asynchronicity issues, I match the dates of any variable available at the daily frequency (e.g., VIX) to the dates on which the end-of-month bond prices are measured. Following CDGM, I consider only bonds having at least 25 observations of monthly yield spread changes.

Table I Panel A reports the summary statistics of the sample of corporate bonds. The sample consists of 449788 observations of monthly yield spread changes of 6826 bonds issued by 936 firms. The average yield spread is 2.38%, with a standard deviation of 3.09%. The average offering size is 741 million dollars, and the average time to maturity is 9 years. Around 21% of the observations are high-yield bonds.

Table I about here

III. Inflation Risk and Yield Spread Changes

In this section, I first outline the advantages of using swap rates to measure inflation risk, particularly in comparison to the more commonly known Treasury Inflation-Protected Securities (TIPS). Next, I define the empirical proxies and investigate the extent to which inflation risk explains variations in yield spread changes. I begin by analyzing the effect of each proxy separately within the CDGM framework, and then assess their joint impact.

[10]The results remain robust considering only bonds with the end-of-month price, as detailed in the Internet Appendix.

[11]Yield spreads are winsorized at the 0.5% level.

A. Inflation Swaps

In 1997, the U.S. Treasury started issuing Treasury Inflation-Protected Securities, fixed coupon bonds whose principal amount is adjusted daily based on the Consumer Price Index (CPI) for All Urban Consumers in the third preceding calendar month. Beginning with the first TIPS auction, market participants began to make markets in inflation derivatives as a way of hedging inflation risk. Zero-coupon inflation swaps quickly became one of the most liquid inflation derivatives in the over-the-counter market. These swaps are forward contracts in which the buyer pays a fixed nominal rate and receives an inflation-linked payment from the seller. They are quoted with maturities ranging from 1 to 30 years and, along with nominal Treasuries, offer an alternative means of measuring real yields.

I use inflation swap rates as a more reliable reflection of market participants' inflation expectations for several reasons. First, inflation swaps tend to predict future inflation rates more accurately than surveys. As shown by Diercks, Campbell, Sharpe and Soques (2023), inflation swaps align more closely with realized inflation rates than survey forecasts, which exhibit less variation. Although inflation swaps display higher variance than survey expectations, they remain less volatile than realized inflation.[12] Second, at medium to long horizons, inflation swaps carry only a minimal risk premium component. Bahaj, Czech, Ding and Reis (2023) utilize transaction-level data from UK inflation swaps and show that the supply of long-term inflation protection is highly elastic, reflects economic fundamentals, and rapidly adjusts to new information. Finally, compared to TIPS, inflation swaps offer a more unbiased and reliable measure of inflation expectations due to several key differences. The TIPS inflation adjustment is bounded below at its issuance value providing an embedded put option that protects investors against deflation on the bond's principal payment (e.g., Grishchenko, Vanden and Zhang (2016); Christensen, Lopez and Rudebusch (2016)). Because this option has a nonnegative value, it lowers TIPS yields compared to

[12] In the Internet Appendix, I show, consistent with Diercks, Campbell, Sharpe and Soques (2023), that, compared to the actual realized inflation, surveys tend to cluster most forecasts around 2%, while inflation swap rates generally show more variation.

bonds that are fully indexed to inflation. Zero-coupon inflation swap contracts do not contain this option. Therefore, all else equal, the break-even inflation rate (Treasury rate minus TIPS rate) based on a TIPS principal strip should be higher than the equivalent maturity inflation swap rate. In addition to the deflation option, studies by Elsasser and Sack (2004), Fleckenstein, Longstaff and Lustig (2014), D'Amico, Kim and Wei (2018), and Andreasen, Christensen and Riddell (2021) consistently show that TIPS break-even inflation rates fall below survey-based inflation expectations and that Treasury bonds are almost always overvalued relative to inflation-swapped TIPS. This mispricing narrows as additional capital flows into the markets and as liquidity increases.[13] Therefore, TIPS yields contain a liquidity premium because, like other bonds, they are held in buy-and-hold investors' portfolios, causing break-even inflation rates to diverge further from inflation swap rates.

Overall, these factors motivate the use of inflation swaps as a more accurate and less biased measure of inflation expectations compared to alternative instruments.

B. Inflation Risk Proxies

Multiple theories, such as Bhamra, Fisher and Kuehn (2011), Gomes, Jermann and Schmid (2016), and Bhamra, Dorion, Jeanneret and Weber (2022), are based on the observation that corporate debt is denominated in nominal dollars and firms have sticky leverage, as they do not adjust their leverage in response to movements in expected inflation. As a result, an increase in expected inflation reduces the real value of debt, lowering the default risk and yield spreads, even in the presence of flexible prices and wages. Moreover, over the past two decades, inflation has consistently shown a positive relationship with real growth (e.g., Campbell, Pflueger and Viceira (2020); David and Veronesi (2013); Bonelli, Palazzo and

[13]Even in the most recent sample, the pattern is consistent with previous studies; the inflation swap rate minus TIPS implied break-even rate exhibits time variation, with a positive average and peaking during periods of low liquidity. This evidence is consistent with Campbell, Shiller and Viceira (2009) and Haubrich, Pennacchi and Ritchken (2012), who attribute the spike in TIPS yields after Lehman Brothers' bankruptcy to Lehman's extensive use of TIPS for collateralizing its repo borrowings and derivative positions and with Fleckenstein, Longstaff and Lustig (2014) which finds that the price difference narrows when the U.S. auctions nominal Treasuries or TIPS, and it widens when dealers have difficulty obtaining Treasury securities, such as during a period of increased repo failures. Detailed figures are provided in the Internet Appendix.

Yamarthy (2025)), which further amplifies the reduction in default risk, as firms benefit from increases in expected cash flow. From an opposing viewpoint, a decline in expected inflation can create a debt overhang, which, as Gomes, Jermann and Schmid (2016) demonstrates, leads to financial frictions that increase yield spreads by distorting investment and production decisions. To capture all these effects, I measure changes in expected inflation with changes in the cash-flow-matched swap rate ($\Delta E[\mu^S]_{i,t}$). Changes in expected inflation should be negatively associated with changes in yield spreads[14].

In the models of David (2008) and Kang and Pflueger (2015), the defaultable bond price can be regarded as a risk-free bond price minus the price of a put option on the nominal asset value of the firm. Inflation uncertainty increases the likelihood of defaults by raising cash-flow volatility–driven by uncertainty in future prices–and increasing the firm's default threshold, i.e., the value of the put option.[15] To capture this effect, I define the volatility of expected inflation ($\Delta\sigma^S_{i,t}$) as the change in the monthly standard deviation of the cash-flow-matched swap rate. This proxy should be positively correlated with yield spreads.

Lastly, beyond the direct effect of expected deflation, default risk further increases when firms experience lower growth alongside higher real liabilities (e.g., Kang and Pflueger (2015); Bhamra, Dorion, Jeanneret and Weber (2022)). To measure inflation cyclicality, I use the stock-bond correlation, which is an indirect, reduced-form proxy for the correlation between inflation and real asset growth (e.g., Campbell, Pflueger and Viceira (2020); Fang, Liu and Roussanov (2025); Bonelli, Palazzo and Yamarthy (2025)). I compute the stock-bond correlation as the three-month rolling correlation between the 10-year Treasury bond and the S&P 500 return, and define my proxy (ΔCor^{SB}_t) as its monthly change. When stock-bond return correlation increases, it signals rising stagflation risk – where both high inflation and

[14] Bonelli, Palazzo and Yamarthy (2025) shows that the sign of this sensitivity is time-varying, depending on how investors perceive inflation to be correlated with expected growth. In the sample, inflation has been unconditionally positively related to expected growth; as such, the unconditional sensitivity should be negative. Capturing additional time-varying sensitivity can only improve the explanatory power.

[15] A more indirect effect can be found in the model of Fischer (2016), which suggests that long-term inflation uncertainty can affect the value of bonds by delaying or misallocating investments due to price uncertainty. As in Baldwin and Ruback (1986), increasing uncertainty makes short-lived assets relatively more valuable, ceteris paribus, leading to higher yield spreads.

weak growth cause stocks and nominal bonds to fall together – thus changes in this measure are expected to be positively correlated with yield spread changes.

In Table I Panel B, I present the unconditional correlations between the changes in yield spreads and the inflation risk proxies, as well as among the proxies themselves. The pair-wise correlations are relatively low and comparable to those typically observed in nominal Treasury rates, with the highest correlation of -34.6% occurring between $\Delta\sigma^S_{i,t}$ and $\Delta E[\mu^S]_{i,t}$. I also report the standard deviations of the variables to facilitate the interpretation of their economic impact in subsequent regression analyses.

C. Baseline Results

I begin the analysis by demonstrating that recent U.S. corporate bond market data still exhibits substantial unexplained variation and significant commonality in yield spread changes. To establish a baseline, I replicate the results from CDGM using firm-specific and macroeconomic determinants of yield spread changes motivated by structural models 'a la Black and Scholes (1973) and Merton (1974). These baseline findings serve as a reference for the subsequent analysis.

I define the vector of CDGM proxies as $\boldsymbol{\Delta S}_{i,t}$ and estimate the following regression model for each bond i with yield spread changes $\Delta YS_{i,t}$:

$$\Delta YS_{i,t} = \alpha_i + \boldsymbol{\beta}_i^T \boldsymbol{\Delta S}_{i,t} + \varepsilon_{i,t}. \tag{1}$$

I report the results in column (1) of Table II.[16] The explanatory power is low and comparable to CDGM, with an adjusted mean R^2 of 35.4%, indicating that about two-thirds of the variance remains unexplained. In Panel B, I investigate whether the unexplained variance exhibits systematic commonality. Following the empirical procedure of CDGM, I assign each bond to one of 18 cohorts based on time to maturity (under five years, five to eight years,

Table II about here

[16]Detailed results of the baseline regression and PCA estimation are available in the Internet Appendix.

and more than eight years) and leverage (below 15%, 15%–25%, 25%–35%, 35%–45%, 45%–55%, and above 55%). For each cohort, I compute the average of the regression residuals $\varepsilon_{g,t}$ across the bonds in the cohort for each month t and then perform a PCA on these residuals to capture the properties of the remaining variation.[17]

Importantly, there is a strong systematic factor structure of the regression residuals. The total unexplained variance (trace of residual covariance matrix) is 115 basis points, with 79.4% captured by the first principal component (PC1), whereas the second component (PC2) explains only 5.2%. These results are in line with the findings of CDGM and He, Khorrami and Song (2022), which report an explanatory power of PC1 of 75% and 80%, respectively, while they are significantly higher than Friewald and Nagler (2019) and Eisfeldt, Herskovic and Liu (2024), reporting only 48.4% and 57.2%.

In columns (2) to (8), I expand the baseline specification to assess the impact of inflation risk on yield spread changes. I define the vector of inflation risk proxies as $\boldsymbol{\Delta I}_{i,t}$ and run the following time-series regression for each bond i:

$$\Delta YS_{i,t} = \alpha_i + \boldsymbol{\beta}_i^T \boldsymbol{\Delta S}_{i,t} + \boldsymbol{\theta}_i^T \boldsymbol{\Delta I}_{i,t} + \boldsymbol{\Gamma}_i^T \boldsymbol{\Delta C}_{i,t} + \nu_{i,t} \tag{2}$$

where $\boldsymbol{\Delta S}_{i,t}$ represents the CDGM variables, and $\boldsymbol{\Delta C}_{i,t}$ includes additional proxies for OTC market frictions as defined by Friewald and Nagler (2019), intermediary risk factors from He, Khorrami and Song (2022), and interdealer price dispersion from Eisfeldt, Herskovic and Liu (2024).

The results, including average coefficients, t-statistics, and mean and median R^2 values, are reported in Panel A of Table II. The t-statistics are computed from the cross-sectional variation in the coefficient estimates within each cohort; the average coefficient is divided by the standard deviation of the coefficient estimates and scaled by the square root of

[17] Notably, the above 55% leverage group accounts for the majority of variation, summing across all maturities, it constitutes 45% of the overall variation. This is in line with He, Khorrami and Song (2022) findings.

the number of bonds in each cohort.[18] In columns (2) to (4), each inflation risk proxy is tested individually, while in columns (5) to (8), they are tested jointly, with additional intermediation controls.

Each inflation risk proxy is statistically significant, both individually and jointly, with t-statistics ranging from 5 to 38. Yield spreads narrow with increases in expected inflation and widen with both inflation volatility and inflation-growth cyclicality (the latter proxied by the stock–bond correlation). Overall, adding these proxies increases the mean and median adjusted R^2 by 8.5 and 7.7 percentage points, respectively. This represents a substantial improvement, especially considering that the analysis focuses on changes in yield spreads rather than their levels. In columns (6) to (8), I further control for variables related to OTC market intermediation. The inflation risk effect remains significant, consistent, and robust across all specifications.

To evaluate the general explanatory power of the inflation risk proxies on yield spread changes, I measure the fraction of the total variation in the residuals explained by each new proxy, following He, Khorrami and Song (2022). Specifically, for each cohort, I compute the total unexplained variation of yield spread residuals after adding each proxy ($\sigma_\nu^2 = \frac{\sum_{t=1}^{T}(\nu_{g,t}-\overline{\nu}_g)^2}{T-1}$), and then calculate the fraction of variation explained as

$$\mathrm{FVE} = 1 - \frac{\sum_g^{18} \sigma_{\nu_g}^2}{\sum_g^{18} \sigma_{\varepsilon_g}^2}, \tag{3}$$

where g represents the 18 cohorts by leverage and maturity, and ε_g are the cohort g residuals from the model without inflation risk.[19] On average, each of the inflation risk proxies reduces the unexplained variance by 16 basis points, and collectively, they account for 36.8% of the total systematic variation of yield spread changes residuals. This explanatory power

[18]This standard error calculation method is commonly used in the literature (e.g., CDGM; He, Khorrami and Song (2022); Friewald and Nagler (2019); Eisfeldt, Herskovic and Liu (2024)).

[19]FVE measures the fraction of residual variation explained by inflation risk proxies relative to the specification-benchmark, which changes relative to which controls are included. Each column's FVE is calculated using residuals from the same specification without inflation proxies as the denominator.

is substantial, particularly in comparison to previous studies. For example, at a quarterly frequency, He, Khorrami and Song (2022) finds that dealer inventory and an intermediary distress factor explain 43% of the systematic variation in residuals, while Friewald and Nagler (2019) shows that OTC market frictions account for about 45%. The large explanatory power is also evident when controlling for intermediation variables. In column (8), where all intermediation-related variables are accounted for, inflation risk still accounts for 26.7% of the remaining variation.

Next, to better understand the effect of inflation risk, I analyze the remaining variation. I calculate the average of the regression residuals $v_{g,t}$ for each cohort g, defined by three maturity and six leverage groups, in month t after adding a new variable and then run a PCA on these residual series. Inflation risk proxies decrease the proportion of unexplained variance associated with the common component, PC1, by 3.2 percentage points on average, and overall by 8.9 percentage points, that is, from 79.4% in the CDGM benchmark to 70.5%. To test for the significance of the reduction in unexplained variance, I run a time series regression of PC1 on the inflation risk variables.[20] Panel C reports the R^2 values, as well as the F-statistics and corresponding Wald test p-values. Overall, the inflation proxies are significantly related to the common component. Columns (2) to (4) assess the relative importance of each proxy. The resulting R^2 value reflects the relative variance of PC1 explained by each proxy. Changes in inflation volatility have the highest explanatory power for PC1, with a R^2 value of 15.6%. When all inflation risk measures are included, the adjusted R^2 increases to 21.5%, with an F-statistic of 19.8, significant at the 1% level. This suggests that inflation risk accounts for more than one-fifth of the original common component. The FVE and PC1 R^2 metrics capture complementary but distinct dimensions of inflation risk's explanatory power. The FVE measures inflation risk's direct contribution to reducing total residual variance – answering how much unexplained variation is eliminated when inflation proxies are added.

[20]Since the expected inflation and volatility proxies are bond-month level variables, I use their monthly averages across bonds. This aggregation does not affect the results, as the findings remain consistent when using 10-year swap rates instead.

In contrast, the PC1 R^2 isolates inflation risk's role in driving the latent common factor that dominates residual comovement. While the FVE quantifies variance reduction in aggregate, the PC1 R^2 shows inflation risk's structural importance as a determinant of the systematic component that standard credit variables cannot account for. Both metrics converge on the same conclusion: inflation risk is fundamental to understanding the bond pricing puzzle.

Although I have established that the proxies are statistically significant and that their explanatory power is substantial, their economic importance also warrants discussion. I rely on the full model in column (8) and analyze the implied yield spread change resulting from a one-standard deviation change in each proxy. For instance, $\Delta E[\mu^S]_{i,t}$ has a price impact of 8.9 basis points, while $\Delta\sigma^S_{i,t}$ of around 5.4 basis points and ΔCor^{SB}_t has the smallest price impact of around 1.1 basis points. These price impacts are considerable, especially when compared to the impact of a one-standard deviation change in the 10-year Treasury rate, which is around 9 basis points – close to the effect of changes in expected inflation. Moreover, the price impact is substantial compared to the mean and median yield spreads. In fact, a one standard deviation change in the swap rate decreases the mean yield spread of 3.7% and the median of 5.8%.

In Table II, I used the standard CDGM methodology where the coefficient estimates are the cross-sectional averages of bond-level time-series regressions. However, Eisfeldt, Herskovic and Liu (2024) points out that one limitation of this methodology is the potential noise in the time-series beta estimates, which could affect the standard errors of the average coefficients. To mitigate this concern, I re-estimate the specifications in Table II using a panel regression approach with bond fixed effect, clustering standard errors at both bond and month level. Specifically, I estimate the following model:

$$\Delta YS_{i,t} = \eta_i + \boldsymbol{\beta}^T \boldsymbol{\Delta S}_{i,t} + \boldsymbol{\theta}^T \boldsymbol{\Delta I}_{i,t} + \boldsymbol{\Gamma}_i^T \boldsymbol{\Delta C}_{i,t} + \nu_{i,t}, \tag{4}$$

where η_i represents the bond fixed effect, and $\boldsymbol{\Delta S}_{i,t}$, $\boldsymbol{\Delta I}_{i,t}$, and $\boldsymbol{\Delta C}_{i,t}$ are the previously defined

Table III

vectors of explanatory variables. The results of this estimation are reported in Table III.

The main distinction between this panel specification and the CDGM approach is that the panel model estimates coefficients that are common to all bonds, rather than bond-specific slopes. This adjustment leads to a notable difference in the fit of the model. While the CDGM approach allows for a more flexible structure and achieves a higher overall fit, with an average R^2 of 35.4%, the panel regression produces a lower fit with an adjusted R^2 of 15.6%. Despite this difference in model fit, the coefficients in the panel regression remain statistically and economically significant, and are consistent in magnitude with those reported in Table II.

In sum, the baseline analysis shows that inflation risk significantly affects yield spreads: (1) the three proxies together explain about a quarter of the previously unexplained variation in yield spread changes after accounting for structural factors and intermediation frictions, and (2) a substantial part of the latent factor is linked to time-varying inflation risk.

IV. Heterogeneity of Inflation Risk

In this section, I investigate the potential heterogeneity effects of inflation risk across various bond characteristics. To this end, I estimate regression coefficients for different bond cohorts.[21] Each bond is assigned to a cohort based on specific criteria: average leverage ratios (less than 15%, 15%–25%, 25%–35%, 35%–45%, 45%–55%, and greater than 55%), bond ratings (AAA-AA, A, BBB, BB, and B-C), industry characteristics such as cash-flow flexibility, refinancing intensity, and the proportion of floating-rate debt (greater than 5%). To ensure consistency, I focus on bonds with at least 25 monthly observations within each cohort. Figure 1 presents the average coefficients with the 5% confidence intervals (bars) and the median coefficients (dots) in each cohort, divided into three panels.[22] Panel A presents results for inflation expectations, Panel B for inflation volatility, and Panel C for cyclicality.

Figure 1 about here

[21]In unreported results, I show that the heterogeneity results are consistent when using fixed-effects regressions with interactions.

[22]The relative tables are reported in the Internet Appendix.

The first graph from the left displays results for the leverage cohorts, while the second shows results for credit ratings. In all three panels, coefficients are increasing in leverage and decreasing in bond ratings, consistent with the effect of inflation risk being dependent on the ex-ante default risk. Intuitively, an increase in expected inflation will significantly reduce the real debt-to-equity ratio for highly leveraged firms as it lowers the real value of their debt. This reduction in real leverage leads to a further decrease in the yield spread for these firms. A similar logic applies to credit ratings. Even after accounting for the large ex-ante differences in yield spreads, the impact in the above 55% (B-C) group is greater than in the below 15% (AAA-AA) group. For instance, a one standard deviation increase in expected inflation results in a 5% (4.1%) decrease in the average yield spread for the above 55% leverage (B-C) cohort, compared to only a 2.9% (1.7%) decrease in the below 15% (AAA-AA) cohort.

The third figure focuses on cash-flow flexibility, measured using an industry-wide proxy. To construct the cash-flow flexibility proxy, I begin by calculating the output flexibility of each industry (defined as 3-digit NAICS code), as the average absolute variation in the industry's Producer Price Index (PPI). Next, I adjust the measure by scaling it according to the output flexibility of the input industries, weighted by the total value of those inputs, which accounts for differences in input costs across industries. Then, I assign each bond to a cohort based on the average cash-flow flexibility of the industry during the life of the bond. The coefficient magnitudes increase with cash-flow flexibility, suggesting that industries with more flexible cash flows are more sensitive to inflation risk. As cash flows are more closely tied to real prices, the friction between nominal debt and real cash flow is amplified, leading to greater sensitivity of yields to inflation risk. Specifically, a one standard deviation increase in inflation expectations results in a 4.2% decrease in the average yield spread for flexible cash-flow bonds, compared to a 2.6% decrease in the sticky cash-flow cohort.

Figure four examines the effect of refinancing intensity, defined as the percentage of debt maturing within three years. Higher refinancing intensity corresponds to a shorter effective maturity structure, while low refinancing intensity implies more distant refinancing needs. Coefficients decline with refinancing intensity, indicating that firms with more distant refinancing needs (low refinancing intensity) are more sensitive to inflation risk. Two mechanisms underlie this relationship: (1) leverage and refinancing intensity have opposing effects on default probabilities (e.g., Friewald, Nagler and Wagner (2022)), with lower refinancing intensity correlating with higher default risk, and (2) the fixed nominal nature of bond coupon payments makes firms with low refinancing intensity less likely to adjust these payments in the short term, increasing their debt's sensitivity to inflation.[23] The final figure presents coefficients for firms with a high proportion of floating-rate bonds compared to those that predominantly issue fixed-rate bonds.[24] Firms with floating-rate bonds show lower sensitivity to inflation risk as their coupon payments adjust with interest rate movements, thereby mitigating the friction between nominal debt and real cash flow.

Overall, I find significant heterogeneous effects of inflation risk on yield spreads. Higher leverage and lower credit ratings heighten exposure to inflation risk, while floating-rate debt mitigates it by allowing coupon payments to adjust with interest rate movements. Consistent with the refinancing-intensity results, firms with more distant refinancing needs experience stronger inflation effects because their nominal payment terms remain fixed for longer. These findings underscore the key role of firm- and bond-specific characteristics in shaping the impact of inflation risk on corporate bond markets, highlighting the default risk and pass-through channels, and emphasizing the need to account for heterogeneity in its effects.

[23] In the Internet Appendix, I report heterogeneity tests examining the effect of debt growth (the average change in debt over the bond's life). While coefficients decline with refinancing intensity, they increase with debt growth, suggesting that firms with greater debt expansion are more exposed to inflation risk. Raising debt might not only increase default risk but also the real value of debt, offsetting the inflation-induced erosion.

[24] Given that the majority of firms issue only fixed-rate bonds, I define a firm as having a large share of floating-rate bonds if more than 5% of its total bond issuance includes instruments that are not strictly fixed-rate.

V. Additional Evidence and Robustness

In this section, I show that the results are robust to alternative variables related to yield spread changes, to different inflation risk proxies, and are not influenced by the specific method of aggregating residuals.

A. Robustness

First, I establish the robustness of the results by controlling for alternative variables affecting yield spread changes. In Table IV, I run time-series regressions of yield spread changes onto inflation proxies, controlling for different measures. For each group, the first column presents baseline results, while the second adds the inflation risk proxies. I first control for inflation volatility risk (IVR) from Ceballos (2021), followed by broad macroeconomic variables such as changes in real consumption, income, and unemployment, all of which may be related to inflation risk. Finally, I include variables linked to monetary policy and its uncertainty, specifically changes in the FED funds rate and the Monetary Policy Uncertainty (MPU) measure from Bu, Rogers and Wu (2021). Across all specifications, the effect of inflation risk remains significant and economically meaningful, with explanatory power consistent with the baseline results.

Table IV about here

B. Different Inflation Risk Proxies

The baseline analysis in Table II uses inflation risk proxies derived from zero-coupon inflation swap rates, primarily due to liquidity concerns and the deflation option in TIPS (e.g., D'Amico, Kim and Wei (2018)). I show that the results remain robust when using TIPS rates, non-cash-flow-matched swap proxies such as the 10-year inflation swap rate, or CPI-based proxies, which, as non-traded instruments, are free from concerns about risk premia.

First, I construct TIPS-based inflation risk proxies using off-the-run, seasonally adjusted

TIPS break-even rates as an alternative to inflation swap rates. The off-the-run TIPS rates come from Gürkaynak, Sack and Wright (2010), who derive them from TIPS coupon bond yields for maturities ranging from 2 to 20 years. I seasonally adjust these rates following the procedure outlined in Section III and replicate the baseline results from Table II using the new proxies. Second, I construct non-cash-flow-matched inflation proxies, using for all bonds the 10-year swap rate. Finally, I follow Boons, Duarte, de Roon and Szymanowska (2020) to construct CPI-based measures derived from the residuals and volatility of an ARMA(1,1) model applied to realized monthly CPI. Jointly with these new proxies, I use the stock-bond correlation as a cyclicality proxy since it does not rely on a specific inflation measurement. In the final column, I test an alternative growth-inflation correlation measure. Specifically, I compute firm asset values monthly following Bharath and Shumway (2008) and calculate the 3-year rolling correlation between monthly asset growth and the one-year inflation swap rate for each firm. The proxy is then the change in the average correlation across firms.

Table V presents time-series regressions of yield spread changes on these alternative inflation proxies. Column (1) shows the baseline results with all controls. Columns (2) to (4) report results using TIPS, non-cash-flow-matched swaps, and CPI-based proxies, respectively. Regardless of the proxies used, the results are consistent with the baseline, with inflation proxies explaining 26.7%, 27.3% and 18.6% of the residual variance, compared to 26.7% for the baseline swap proxies. In the final column, I test an alternative growth–inflation correlation measure, based on firm-level asset growth and the one-year inflation swap rate. This proxy is conceptually closer to the correlation term in the model but is estimated with considerable noise, and its coefficient is small and statistically weak once other inflation proxies and controls are included. As a result, the empirical evidence for a separate cyclicality channel is substantially less robust than for expected inflation and inflation uncertainty. These results show that using different inflation proxies leads to similar conclusions, reinforcing the robustness of the baseline analysis and the importance of inflation risk in explaining yield spread changes.

Table V about here

C. Different Residual Groups

The baseline result on the explanatory power of inflation risk may be influenced by the selection of the variable used to aggregate residuals. To address this concern, I show that the results are robust to different methods of aggregating the residuals. Specifically, I follow the approach of He, Khorrami and Song (2022) and aggregate time-series residuals into five different cohort-formation schemes. The baseline scheme sorts residuals into 18 cohorts by time to maturity (3 bins) and leverage (6 bins). I then alternatively sort residuals by time to maturity combined with each of the following variables: credit rating, trading volume, stock market beta, or VIX beta, yielding 15 or 18 cohorts depending on the scheme. The dollar trading volume is based on the sum of all trades in each bond over the previous month, while the stock market and VIX betas are derived from regression betas on the S&P 500 and the VIX, respectively, as in the baseline CDGM regression. For each scheme, I calculate the average residual within each cohort-month, extract principal components from the residual covariance matrix, and repeat this analysis including inflation risk proxies.

Depending on the variables, the residuals are divided into 18 or 15 cohorts. For each cohort, I calculate the average residual and extract the principal components from the covariance matrix. I then repeat this process including all inflation risk proxies. The results are reported in Table VI. Table VI about here

For each pair of grouping variables, I report the variance explained by the first and second principal components (PC1 and PC2), as well as the fraction of variance explained (FVE). The first row presents results from the model with all control variables, while the second row shows the model including inflation risk proxies. These rows match the results from Table II column (8).

On average, the fraction of variance explained is 26%, with little variation across tests, which is consistent with the baseline results. The smallest fraction of variance explained is seen with the time to maturity and VIX beta sort (23.9 percent), while the time to maturity and volume sort shows the largest fraction (28 percent). Including inflation risk proxies reduces the explanatory power of PC1 by 5.2 percentage points, confirming that the results are independent of how residuals are aggregated. Overall, these additional tests reinforce the conclusion that inflation risk is a major driver of yield spread dynamics.

D. Extended Sample

To assess the robustness of our findings, Table VII extends the baseline analysis using TRACE Enhanced data through 2024. This adds approximately three years of corporate bond transactions, covering a critical period: the post-pandemic inflation surge and the Federal Reserve's aggressive monetary tightening cycle. The expanded sample includes 8,327 bonds from 978 firms, up from 6,826 bonds in Table II.

The core relationships remain stable across the extended sample. The coefficient on expected inflation changes stays robustly negative, ranging from -0.219 to -0.326 across specifications – close to the -0.356 to -0.545 range from the original sample. Similarly, the inflation volatility proxy maintains strong positive coefficients (0.426 to 1.375), while cyclicality continues to show negative loadings with slightly reduced magnitudes. Table VII about here

In the extended sample, regressions of yield spread changes on inflation proxies and controls achieve an adjusted R^2 of 32.8%, indicating that inflation risk helps explain a substantial share of total variation in spread changes. The first principal component of cohort-level residuals explains 79.4% of systematic residual variation; regressions of this PC1 on the inflation proxies yield an R^2 of about 22%, so inflation risk accounts for roughly one-fifth of the common residual component. When adjusting for intermediation frictions, inflation risk proxies explain about 24% of the systematic residual variance, and approximately 10% of the variance of the first principal component itself, compared to 6.7% in the pre-2022 sample.[25]

The consistency of these relationships across the extended period provides strong evidence that inflation risk channels represent fundamental economic mechanisms rather than artifacts

[25] The Enanched version of the TRACE database does not include dealer identifiers, thus I am able to compute 6 out of the 11 OTC market proxies. Namely, changes in dealer inventory, amount outstanding, matched trades, block trades, ted spread, and aggregate rating. Overall, they represent the majority of the effect found in Friewald and Nagler (2019).

of specific macroeconomic conditions. Corporate bond market priced inflation expectations, volatility, and cyclicality through both the low-inflation 2010s and the subsequent inflationary surge. This suggests that nominal friction channels – whereby sticky leverage amplifies firms' inflation sensitivity – operate consistently across diverse macroeconomic regimes.

However, the somewhat smaller coefficients during the high-inflation period may reflect a mechanical effect, as elevated price levels have already eroded the real value of outstanding nominal debt, and this partial deleveraging reduces inflation risk exposure. While inflation risk remains systematically priced, its marginal impact on credit spreads diminishes once substantial inflation has reduced firms' real debt burdens. Overall, the persistence across different regimes provides strong evidence that inflation risk represents a systematic and persistent factor in corporate bond pricing, rather than a transitory phenomenon specific to particular economic conditions.

VI. Motivating Model

In this section, I introduce a structural model of default incorporating debt rollover, stochastic inflation and sticky cash flows, and I explore its implications for yield spreads.[26]

In the model, a representative firm issues nominal debt while facing real cash flow and inflation risks. The friction between nominal debt and real cash flow is the driving force of the relationship between yield spreads and inflation risk. The resulting implications rationalize the key empirical findings of the analysis in Section III: yield spreads (1) decrease with expected inflation, (2) increase with inflation uncertainty, and (3) increase with the correlation between inflation and real asset innovation. In addition, the model generates heterogeneity in the inflation risk effects. The sensitivity of yield spreads to inflation risk increases with default risk and cash-flow flexibility, and decreases with refinancing intensity. I next introduce the setup for the structural model by first discussing the sources of inflation risk, then the debt structure, and lastly the resulting yield spreads implications.

[26] I extend the approach to other structural models in the Internet Appendix.

A. Inflation Risk

To value nominal debt, I specify a price index P_t that follows a Geometric Brownian Motion under the physical probability measure, $\mathbb{P}$, with expected inflation μ_P and inflation volatility σ_P. Let r_r denote the constant real interest rate. Consider a firm with time t real asset value A_t^r. The A_t^r dynamics under $\mathbb{P}$ follow

$$\frac{dA_t^r}{A_t^r} = \mu_{A^r} dt + \sigma_{A^r} dW_t^{P,A^r}, \qquad A^r > 0, \tag{5}$$

with μ_{A^r} and σ_{A^r} constants, and W^{P,A^r} a standard Brownian motion.

Because the firm issues nominal securities and pays taxes in nominal terms, investors primarily focus on changes in nominal cash flows and, consequently, nominal assets. The nominal value of the firm's assets at time t is given by $A_t^n = A_t^r P_t^{\phi}$, where ϕ reflects the extent of inflation's impact on nominal asset growth. Assets are sticky when $\phi < 1$.[27] The real asset and price processes are correlated with a real asset inflation innovation correlation of $\mathbb{E}^{\mathbb{Q}}[dW_t^{P,A^r}, dW_t^{P,P}] = \rho_{A^r P}$.

Thus, under the nominal risk-neutral measure $\mathbb{Q}^n$, the nominal asset process satisfies

$$\frac{dA_t^n}{A_t^n} = \left[r_r + \phi \left(\mu_P + \frac{1}{2}(\phi - 1)\sigma_P^2 \right) \right] dt + \sigma_{A^n} dW_t^{n,A^n} \tag{6}$$

where

$$\sigma_{A^n}^2 = \sigma_{A^r}^2 + \phi^2 \sigma_P^2 + 2\phi \rho_{A^r P} \sigma_{A^r} \sigma_P. \tag{7}$$

B. Debt Structure and Yield Spreads

The firm commits to a stationary debt structure by issuing consol bonds to optimally set its total debt D. Following Leland (1998), the firm continuously retires a fixed fraction mP of its outstanding debt at par, where P represents the total face (book) value of debt and

[27] I utilize cash-flow stickiness and asset stickiness interchangeably, as in structural models of default, assets are affine functions of cash flows.

m denotes the refinancing intensity, where $0 < m \leq 1$. Retired debt is immediately replaced with newly issued debt of the same maturity, coupon, principal, and seniority, ensuring a continuous rollover process.

Debt issuance provides a tax advantage $\tau_{tax}C$, where τ_{tax} is the corporate tax rate and C is the constant coupon, but increases bankruptcy costs borne by equity holders. The coupon flow needs to be paid either with cash flow plus the tax advantage of debt or out of the equity holders' own pockets. Default occurs when equity holders deem the firm's asset value too low to justify further payouts. Upon liquidation, debt holders receive the residual value of the firm after accounting for bankruptcy costs, determined by the recovery rate, R. Consequently, the equity value, E, is determined as the difference between the levered firm value, v, and the debt value, D. The equity holders default if A_t^n declines to a critical endogenous threshold, A_B^n. Define τ the first time the assets hit A_B^n

$$\tau = \inf\{t \mid A_t^n \leq A_B^n\}. \tag{8}$$

Let r_n be equal to $r_r + \phi(\mu_P + \frac{1}{2}(\phi - 1)\sigma_P^2)$. The value of a unit claim at default is

$$\begin{aligned} P_B(A^n) &= \left(\frac{A^n}{A_B^n}\right)^{-\gamma}, \\ \gamma &= \frac{r_n - \frac{\sigma_{A^n}^2}{2} + \sqrt{(r_n - \sigma_{A^n}^2)^2 + 2(r_n m)\sigma_{A^n}^2}}{\sigma_{A^n}^2}. \end{aligned} \tag{9}$$

The debt value follows

$$D(A^n; A_B^n, P, C) = \frac{(C + mP)}{(r_n + m)}\Big[1 - P_B(A^n)\Big] + RA_B^n P_B(A^n), \tag{10}$$

where the first term on the right hand side is the value of the coupon flow up until time τ and the second term is the recovery value in case of bankruptcy. The default boundary, A_B^n, is characterized by the "smooth-pasting" condition, $E'(A_B^n) = 0$. Then, the yield spreads,

$y - r_n$, are given by

$$y - r_n = \frac{C*}{D(A^n; C*, P)} - r_n, \tag{11}$$

where $C*$ is the optimal coupon found by maximizing the firm value.

C. Model Implications

To illustrate how yield spreads relate to inflation risk, I simulate the model 1000 times drawing parameter values for expected inflation, μ_P, inflation volatility, σ_P, and the correlation between inflation and asset growth, $\rho_{A^r,P}$, from reasonable parameter intervals. Expected inflation ranges from -2% to 10%, inflation volatility from 0.5% to 10%, and the correlation between inflation and assets from -1 to 1. All other parameters are fixed according to existing literature, as summarized in Table VIII.[28]

Table VIII about here

C.1. Implications for Yield Spreads

Figure 2 shows the effect of inflation risk on yield spreads with the relative regression lines. Blue (red) dots are observations where the inflation asset growth correlation, ρ_{A^rP}, is positive (negative). Panel A shows that yield spreads decrease in expected inflation. An increase in expected inflation lowers the real value of debt, as debt is denominated in nominal terms. This decline in real debt reduces default risk, leading to narrower yield spreads.

Figure 2 about here

Panel B shows the effect of inflation volatility on yield spreads. Higher inflation volatility affects spreads through two channels. First, the drift channel: as inflation volatility increases, the drift of nominal assets decreases, which increases default risk and widens spreads. Second, the volatility channel: higher inflation volatility directly increases the volatility of nominal assets, also widening spreads. When asset-inflation correlation is positive (blue dots), both channels reinforce each other, creating strong spread widening.[29] When correlation is nega-

[28]The stickiness parameter ϕ is set to 0.4 as in Bhamra, Dorion, Jeanneret and Weber (2022), while recovery rate R and tax rate τ_{tax} are set respectively to 0.5 and 0.35 as in Leland (1998) and Du, Elkamhi and Ericsson (2019).

[29]As in the considered sample the inflation-growth correlation has been unconditionally positive, the

tive (red dots) the cross-term dominates, causing asset volatility to decrease with inflation volatility. This works agaist the drift effect, making the relationship between yield spreads and inflation volatility flatter. The heterogeneity in Figure 2 Panel B reflects this asymmetric response of asset volatility to inflation volatility depending on the sign of asset-inflation correlation.

Lastly, Panel C highlights the effect of the correlation between inflation and real asset innovations, which reflects the cyclicality of inflation risk. In case of a positive correlation, low real assets and high real liabilities tend to occur at the same time, increasing default risk, as in Kang and Pflueger (2015). Yield spreads increase in the correlation between inflation and asset growth, as it magnifies the effect of inflation volatility.

C.2. Heterogeneity Implications

The model also generates predictions about heterogeneity, particularly regarding asset volatility, cash-flow stickiness, and refinancing intensity. It suggests that the impact of inflation risk on a firm varies based on its default risk and cash-flow flexibility.[30]

In the model, holding nominal debt constant, higher asset volatility reduces firm value and raises measured leverage. This places firms closer to their default boundary, amplifying spread elasticities to asset risk. Consequently, firms with higher leverage experience stronger effects from inflation risk. Additionally, as in the model of Friewald, Nagler and Wagner (2022), leverage and refinancing intensity have opposing relationships with default probabilities, with lower refinancing intensity being associated with higher default risk. Thus, for a given leverage level, when refinancing intensity is low, default risk tends to be higher, making increases in expected inflation have a more significant impact.

Cash-flow or asset stickiness influences the extent to which inflation risk passes through to both asset growth and volatility. As shown in Eq. 6, expected inflation increases the

amplification mechanism (positive ρ_{A^rP} leading to positive spread-volatility relationships) is the empirically most relevant case.

[30]Detailed figures on heterogenous effects can be found in the Internet Appendix.

drift of nominal assets based on the stickiness parameter, ϕ. In case of perfectly flexible assets ($\phi = 1$), inflation risk fully passes through to yield spreads, whereas in the sticky cash-flows case ($\phi < 1$), the effect is dampened. Consequently, a firm with flexible cash flows experiences greater decreases in yield spreads following an increase in expected inflation. The same mechanism applies to asset volatility, with firms having flexible cash flows being more sensitive to inflation risk than those with sticky cash flows.

Although stylized, the model incorporates all necessary features to capture the effect of inflation risk on yield spreads. In summary, it rationalizes yield spreads decreasing with expected inflation and increasing with inflation volatility and cyclicality. Consistent with the empirical findings, it highlights two transmission mechanisms. The model further suggests that inflation risk has a greater impact on yield spreads for firms with higher default probability (as reflected in leverage and rating), lower refinancing intensity, and more flexible cash flows.

VII. Conclusion

This paper investigates the role of inflation risk in explaining corporate yield spread changes, particularly the unexplained common variation. I find that inflation risk-measured using market-based proxies for expected inflation, uncertainty, and cyclicality–explains about a quarter of the systematic residual variation in yield spread changes that traditional credit risk and intermediation variables fail to capture.

The empirical patterns are consistent with a structural model of default featuring debt rollover, stochastic inflation, and sticky cash flows. The model emphasizes three key aspects of inflation risk: innovations in expected inflation reduce the real value of nominal debt, lowering default risk and narrowing spreads; inflation uncertainty increases firm-level volatility, raising default probabilities and widening spreads; and inflation cyclicality captures state-dependent effects that amplify risk under low-inflation recessions.

Additionally, I document substantial heterogeneity in the impact of inflation risk, reflecting two main transmission channels. Effects are more pronounced for highly leveraged or lower-rated firms, consistent with a default risk channel, where debt deflation disproportionately benefits riskier firms. Firms with distant refinancing needs are also more sensitive, reflecting higher default risk and delayed coupon adjustments. At the same time, industries or firms with flexible cash flows show greater sensitivity, whereas floating-rate debt mitigates exposure, consistent with a pass-through channel, where limited balance sheet flexibility amplifies the impact of inflation shocks.

These findings also suggest several avenues for future research beyond the scope of this paper. For instance, future research could examine whether the heterogeneous effects of inflation risk, particularly concerning refinancing needs, extend to equity prices–for example, by building on the work of Bhamra, Dorion, Jeanneret and Weber (2022) to incorporate a debt maturity structure. Another potential research direction is to examine how firms' corporate financing and issuance choices respond to different inflation scenarios, both empirically and theoretically, thereby extending the framework of Gomes, Jermann and Schmid (2016) and Gomes and Schmid (2021).

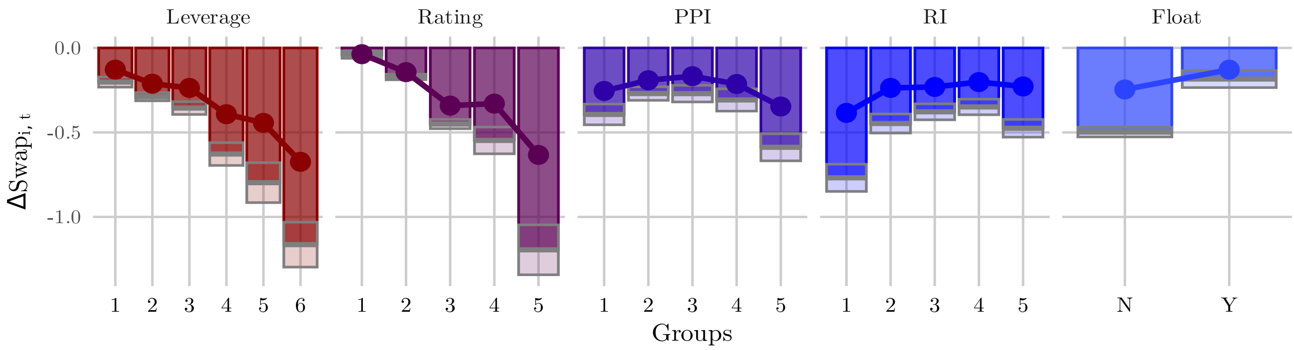
In conclusion, inflation risk accounts for a significant share of the systematic residual variation in yield spread changes and sheds light on the common component that standard credit risk variables fail to capture. These findings have important implications for bond pricing, highlighting inflation as a key driver of credit spreads and supporting structural models that incorporate inflation dynamics.

Figure 1: **Heterogeneity in Inflation Risk**

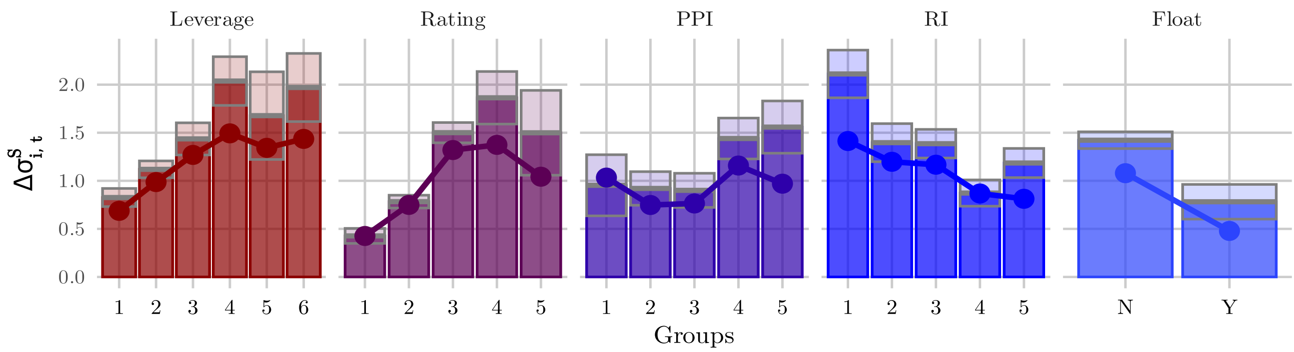
For each industrial bond i with at least 25 monthly observations of yield spread changes $\Delta YS_{i,t}$, I estimate the model:

$$\Delta YS_{i,t} = \alpha_i + \beta_i^T \Delta S_{i,t} + \theta_i^T \Delta I_{i,t} + \nu_{i,t},$$

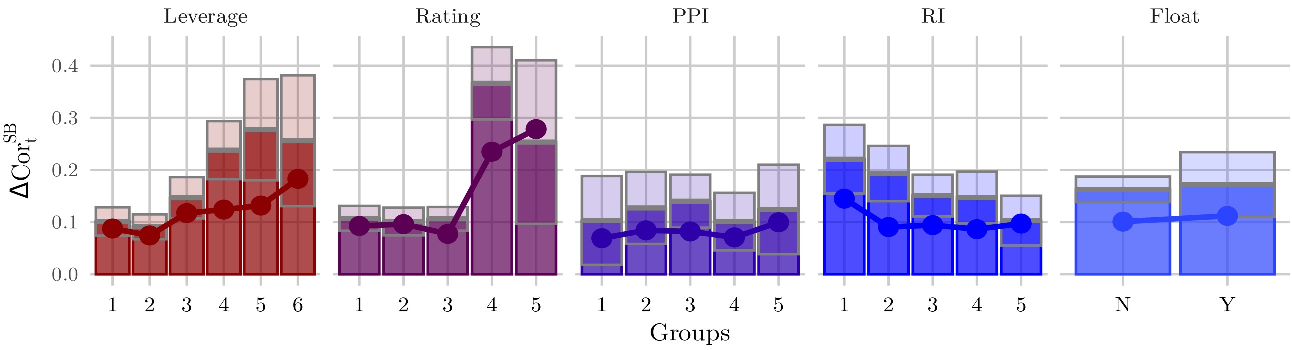
where $\Delta S_{i,t}$ is the vector of structural model variables, and $\Delta I_{i,t}$ refers to the inflation risk proxies. I assign each bond to cohorts based on average leverage ratios (less than 15%, 15%–25%, 25%–35%, 35%–45%, 45%–55%, and greater than 55%), bond ratings (AAA-AA, A, BBB, BB, and B-C), industry cash-flow flexibility (PPI), refinancing intensity (RI), the proportion of debt in floating bonds (greater than 5%). I plot average coefficients by group with its 5% confidence interval. Panel (a) reports results for expected inflation, Panel (b) for inflation volatility and Panel (c) for the correlation. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004–2021.



(a) Expected Inflation



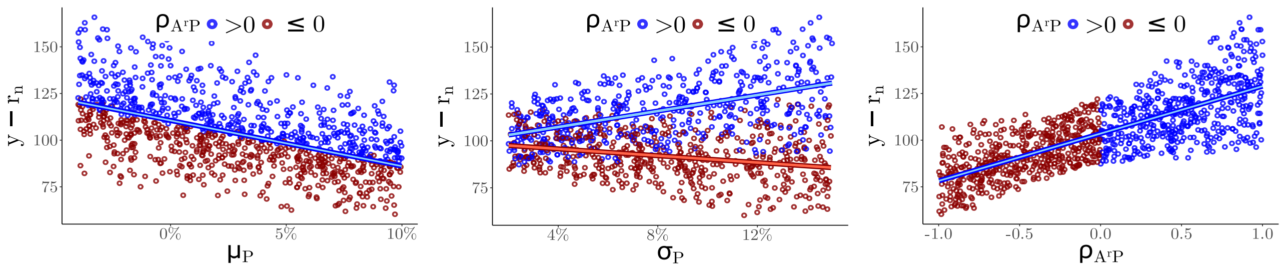
(b) Inflation Volatility



(c) Correlation

Figure 2: **Model Simulation**

This figure shows the yield spread implications of inflation risk. I simulate the model 1000 times where I fix all parameters except the expected inflation rate (μ_P), inflation volatility (σ_P), and the correlation between inflation and assets (ρ_{A^rP}). I uniformly draw these parameters from reasonable intervals: expected inflation varies between -2% and 10%, inflation volatility between 0.5% and 10%, and correlation between inflation and real assets between -1 and 1. Table VIII provides the details about all parameter choices. I also report regression lines. In Panel (b), the regression line is conditional on the correlation between inflation and real assets.



(a) Expected Inflation (b) Inflation Volatility (c) Correlation

Table I: **Summary Statistics**

This table reports summary statistics of the data. Panel A reports the number of observations, mean, standard deviation, and 5%, 25%, 50%, 75% and 95% quantiles of bond characteristics, yield spreads ($YS_{i,t}$), and the proxies of inflation risk ($\Delta E[\mu^S]_{i,t}$, $\Delta\sigma^S_{i,t}$, ΔCor^{SB}_t) introduced in Section III. The bond characteristics include the offering amount, the coupon rate, the bond age, the time to maturity, the duration, and the credit rating. The bond's rating is determined as the average of ratings provided by Standard & Poor (S&P), Moody's, and Fitch when more than one are available or as the rating provided by one of the three rating agencies when only one rating is available. Panel B reports the standard deviation and the correlation matrix of changes in yield spreads and changes in the proxies of inflation risk. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004–2021.

Panel A: Summary Statistics

	Obs.	Mean	Std.	5%	25%	50%	75%	95%
Offering amount (mil.)	449788	741.84	658.33	200	350	500	1,000	2,000
Coupon (%)	449788	5.39	1.97	2.25	3.88	5.38	6.88	8.62
Age	449788	5.51	5.33	0.52	2.05	3.98	7.06	17.43
Time to Maturity	449788	8.99	8.08	0.96	3.38	6.15	10.00	27.27
Duration	449788	6.49	4.29	1.00	3.32	5.46	8.25	15.54
Rating	449788	8.75	3.47	4	6	9	10	15
Monthly Volume (bil.)	449788	5.37	10.09	0.07	0.71	2.42	6.26	19.83
Leverage	449788	0.31	0.21	0.07	0.16	0.26	0.42	0.75
Yield spread (%)	449788	2.38	3.09	0.31	0.82	1.51	2.81	6.69
$\Delta YS_{i,t}$	449788	0.67	83.40	-65.97	-15.50	-1.22	13.16	68.21
$E[\mu^S]_{i,t}$ (%)	449788	2.09	0.59	1.20	1.79	2.13	2.48	2.89
$\Delta E[\mu^S]_{i,t}$	449788	-0.18	25.10	-30.99	-9.62	0.59	11.61	30.67
$\Delta\sigma^S_{i,t}$	449788	0.07	7.27	-6.83	-2.04	-0.07	1.91	7.70
ΔCor^{SB}_t	449788	-0.01	10.59	-17.26	-5.74	0.76	5.78	17.62

Panel B: Correlation Matrix

	Std.	$\Delta YS_{i,t}$	$\Delta E[\mu^S]_{i,t}$	$\Delta\sigma^S_{i,t}$	ΔCor^{SB}_t
$\Delta YS_{i,t}$	0.835	1	-0.300	0.237	-0.007
$\Delta E[\mu^S]_{i,t}$	0.251		1	-0.346	0.035
$\Delta\sigma^S_{i,t}$	0.073			1	0.034
ΔCor^{SB}_t	0.106				1

Table II: **Inflation Risk and Yield Spread Changes**

For each industrial bond i with at least 25 monthly observations of yield spread changes $\Delta YS_{i,t}$, I estimate the model

$$\Delta YS_{i,t} = \alpha_i + \beta_i^T \Delta S_{i,t} + \theta_i^T \Delta I_{i,t} + \Gamma_i^T \Delta C_{i,t} + \nu_{i,t},$$

where $\Delta S_{i,t}$ represents structural model variables, $\Delta I_{i,t}$ denotes inflation risk proxies, and $\Delta C_{i,t}$ refers to control proxies from Friewald and Nagler (2019), He, Khorrami and Song (2022) and Eisfeldt, Herskovic and Liu (2024). Panel A presents average coefficients, t-statistics, mean and median adjusted R^2 values, and sample sizes. Panel B details a principal component analysis on the residuals, reporting the variance explained by the first two principal components and total unexplained variance. Panel C includes R^2 values, F-statistics, and p-value from a Wald-test of the time-series regression of PC1 on inflation risk proxies. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004-2021.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Individual Bond Regressions								
$\Delta E[\mu^S]_{i,t}$		-0.545			-0.493	-0.407	-0.418	-0.356
		(-37.899)			(-36.342)	(-26.682)	(-26.308)	(-22.466)
$\Delta\sigma^S_{i,t}$			1.631		1.408	1.162	1.225	0.742
			(36.840)		(33.330)	(24.594)	(22.107)	(11.695)
ΔCor^{SB}_t				0.287	0.160	0.111	0.107	0.111
				(21.912)	(13.274)	(6.272)	(5.809)	(5.700)
CDGM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FN	No	No	No	No	No	Yes	Yes	Yes
HKS	No	No	No	No	No	No	Yes	Yes
EHL	No	No	No	No	No	No	No	Yes
Mean R^2	0.354	0.385	0.416	0.354	0.439	0.502	0.511	0.524
Median R^2	0.377	0.407	0.428	0.377	0.454	0.531	0.540	0.557
Obs.	449788	449788	449788	449788	449788	449788	449788	449788
Bonds	6826	6826	6826	6826	6826	6826	6826	6826
Panel B: Principal Component Analysis								
FVE		0.198	0.180	0.040	0.368	0.292	0.290	0.267
PC1	0.794	0.741	0.756	0.787	0.705	0.689	0.685	0.656
PC2	0.052	0.077	0.062	0.055	0.086	0.084	0.091	0.095
UV	1.154	0.926	0.946	1.108	0.729	0.454	0.402	0.332
Panel C: Time-Series Regression of PC1 on Inflation Risk Proxies								
Adj. R^2					0.215	0.123	0.108	0.067
R^2		0.134	0.156	0.017	0.226	0.136	0.121	0.080
F-stat		31.784	37.984	3.641	19.875	10.660	9.347	5.949
p-value		0.000	0.000	0.058	0.000	0.000	0.000	0.001
Obs.		208	208	208	208	208	208	208

Table III: **Inflation Risk and Yield Spread Changes: Fixed Effect Regression**

In this table, I estimate the model:

$$\Delta YS_{i,t} = \eta_i + \beta_i^T \Delta S_{i,t} + \theta_i^T \Delta I_{i,t} + \Gamma_i^T \Delta C_{i,t} + \nu_{i,t},$$

where η_i is the bond fixed effect, $\Delta S_{i,t}$ is the vector of structural model variables, $\Delta I_{i,t}$ refers to the inflation risk proxies, and $\Delta C_{i,t}$ denotes control proxies from Friewald and Nagler (2019), He, Khorrami and Song (2022) and Eisfeldt, Herskovic and Liu (2024). I report the coefficients, t-statistics (clustered at bond and month levels), mean and median adjusted R^2 values, and sample sizes. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004–2021.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Individual Bond Regressions								
$\Delta E[\mu^S]_{i,t}$		-0.534			-0.434	-0.400	-0.375	-0.341
		(-4.320)			(-4.499)	(-4.620)	(-4.570)	(-4.549)
$\Delta\sigma^S_{i,t}$			1.560		1.206	1.010	0.969	0.654
			(3.601)		(3.482)	(4.011)	(3.974)	(3.241)
ΔCor^{SB}_t				0.216	0.167	0.149	0.149	0.124
				(1.544)	(1.569)	(1.541)	(1.628)	(1.545)
CDGM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FN	No	No	No	No	No	Yes	Yes	Yes
HKS	No	No	No	No	No	No	Yes	Yes
EHL	No	No	No	No	No	No	No	Yes
Adj. R^2	0.156	0.175	0.172	0.157	0.185	0.195	0.198	0.205
R^2	0.169	0.188	0.185	0.169	0.197	0.208	0.211	0.217
Obs.	449788	449788	449788	449788	449788	449788	449788	449788
Bonds	6826	6826	6826	6826	6826	6826	6826	6826

Table IV: **Additional Variables**

For each industrial bond i with at least 25 monthly observations of yield spread changes $\Delta YS_{i,t}$, I estimate the model:

$$\Delta YS_{i,t} = \alpha_i + \boldsymbol{\beta}_i^T \boldsymbol{\Delta S}_{i,t} + \boldsymbol{\theta}_i^T \boldsymbol{\Delta I}_{i,t} + \boldsymbol{\Gamma}_i^T \boldsymbol{\Delta C}_{i,t} + \nu_{i,t},$$

where $\boldsymbol{\Delta S}_{i,t}$ includes structural model variables, $\boldsymbol{\Delta I}_{i,t}$ refers to inflation risk proxies, and $\boldsymbol{\Delta C}_{i,t}$ includes changes in control proxies related to inflation volatility, consumption, income, unemployment, monetary policy uncertainty, and fed fund rates, along with proxies from Friewald and Nagler (2019), He, Khorrami and Song (2022), and Eisfeldt, Herskovic and Liu (2024). Panel A presents average coefficients, t-statistics, mean and median adjusted R^2 values, and sample sizes. Panel B details a principal component analysis on the residuals, reporting the variance explained by the first two principal components and total unexplained variance. Panel C includes R^2 values, F-statistics, and p-value from a Wald-test of the time-series regression of PC1 on inflation risk proxies. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004-2021.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Individual Bond Regressions										
ΔIVR_t	31.754	31.226								
	(9.676)	(7.949)								
$\Delta Consumption_t$			3.392	3.898						
			(3.166)	(3.635)						
$\Delta Income_t$			3.164	3.308						
			(5.568)	(4.932)						
$\Delta Unemployment_t$			0.093	0.061						
			(4.759)	(3.579)						
ΔMPU_t					-0.008	-0.004			-0.003	0.007
					(-1.598)	(-0.564)			(-0.567)	(0.808)
$\Delta FED\ Fund_t$							0.013	0.105	0.017	0.116
							(0.401)	(2.611)	(0.501)	(2.702)
$\Delta E[\mu^S]_{i,t}$		-0.338		-0.238		-0.357		-0.343		-0.343
		(-19.342)		(-13.309)		(-17.874)		(-19.750)		(-15.927)
$\Delta\sigma^S_{i,t}$		0.676		0.689		0.844		0.761		0.911
		(8.337)		(8.563)		(9.084)		(9.927)		(8.228)
ΔCor^{SB}_t		0.147		0.161		0.091		0.115		0.106
		(6.127)		(6.733)		(3.775)		(5.275)		(4.090)
CDGM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FN	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HKS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Ye	Yes	Yes
EHL	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Mean R^2	0.501	0.521	0.521	0.540	0.502	0.525	0.507	0.529	0.507	0.531
Median R^2	0.531	0.563	0.555	0.579	0.529	0.560	0.534	0.564	0.533	0.566
Obs.	449788	449788	449788	449788	449788	449788	449788	449788	449788	449788
Bonds	6826	6826	6826	6587	6826	6826	6826	6826	6826	6729
Panel B: Principal Component Analysis										
FVE		0.266		0.263		0.272		0.270		0.275
PC1	0.705	0.653	0.689	0.632	0.707	0.654	0.708	0.654	0.706	0.651
PC2	0.085	0.098	0.078	0.095	0.081	0.096	0.081	0.094	0.081	0.095
UV	0.428	0.314	0.366	0.270	0.446	0.324	0.430	0.314	0.422	0.306
Panel C: Time-Series Regression of PC1 on Inflation Risk Proxies										
Adj. R^2		0.071		0.060		0.067		0.065		0.064
R^2		0.084		0.074		0.081		0.078		0.078
F-stat		6.272		5.411		5.957		5.766		5.752
p-value		0.000		0.001		0.001		0.001		0.001
Obs		208		208		208		208		208

Table V: **Alternative Inflation Risk Proxies**

For each industrial bond i with at least 25 monthly observations of yield spread changes $\Delta YS_{i,t}$, I estimate the model

$$\Delta YS_{i,t} = \alpha_i + \beta_i^T \Delta S_{i,t} + \theta_i^T \Delta I_{i,t} + \Gamma_i^T \Delta C_{i,t} + \nu_{i,t},$$

where $\Delta S_{i,t}$ represents structural model variables, $\Delta I_{i,t}$ to the vector of alternative proxies for inflation risk defined in Section V.B, and $\Delta C_{i,t}$ refers to control proxies from Friewald and Nagler (2019), He, Khorrami and Song (2022) and Eisfeldt, Herskovic and Liu (2024). Panel A presents average coefficients, t-statistics, mean and median adjusted R^2 values, and sample sizes. Panel B details a principal component analysis on the residuals, reporting the variance explained by the first two principal components and total unexplained variance. Panel C includes R^2 values, F-statistics, and p-value from a Wald-test of the time-series regression of PC1 on inflation risk proxies. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004-2021.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Individual Bond Regressions						
$\Delta E[\mu^S]_{i,t}$		-0.356				-0.328
		(-22.466)				(-19.414)
$\Delta\sigma^S_{i,t}$		0.742				0.850
		(11.695)				(12.719)
$\Delta E[\mu^S]_{10,t}$			-0.358			
			(-15.564)			
$\Delta\sigma^S_{10,t}$			0.811			
			(6.768)			
$\Delta E[\mu^T]_{i,t}$				-0.321		
				(-21.909)		
$\Delta\sigma^T_{i,t}$				0.354		
				(6.470)		
ΔCPI_t					-0.160	
					(-15.722)	
$\Delta\sigma^{CPI}_t$					0.308	
					(8.451)	
ΔCor^{SB}_t		0.111	0.146	0.108	0.183	
		(5.700)	(6.808)	(5.427)	(9.053)	
ΔCor^{IA}_t						0.021
						(0.121)
CDGM	Yes	Yes	Yes	Yes	Yes	Yes
FN	Yes	Yes	Yes	Yes	Yes	Yes
HKS	Yes	Yes	Yes	Yes	Yes	Yes
EHL	Yes	Yes	Yes	Yes	Yes	Yes
Mean R^2	0.501	0.524	0.520	0.524	0.504	0.529
Median R^2	0.528	0.557	0.559	0.559	0.538	0.563
Obs.	449788	449788	449788	449788	449788	446492
Bonds	6826	6826	6826	6826	6826	6778
Panel B: Principal Component Analysis						
FVE		0.267	0.273	0.284	0.186	0.276
PC1	0.708	0.656	0.650	0.650	0.676	0.655
PC2	0.082	0.095	0.095	0.097	0.093	0.096
UV	0.452	0.332	0.329	0.324	0.368	0.328
Panel C: Time-Series Regression of PC1 on Inflation Risk Proxies						
Adj. R^2		0.067	0.118	0.115	0.073	0.056
R^2		0.080	0.131	0.127	0.086	0.070
F-stat		5.949	10.273	9.934	6.398	5.020
p-value		0.001	0.000	0.000	0.000	0.002
Obs.		208	208	208	208	205

Table VI: **Different Residual Groups**

For each industrial bond i with at least 25 monthly observations of yield spread changes $\Delta YS_{i,t}$, I estimate the model:

$$\Delta YS_{i,t} = \alpha_i + \beta_i^T \Delta S_{i,t} + \theta_i^T \Delta I_{i,t} + \Gamma_i^T \Delta C_{i,t} + \nu_{i,t},$$

where $\Delta S_{i,t}$ is the vector of structural model variables, $\Delta I_{i,t}$ refers to inflation risk proxies, and $\Delta C_{i,t}$ includes control proxies from Friewald and Nagler (2019), He, Khorrami and Song (2022) and Eisfeldt, Herskovic and Liu (2024). I assign each month's residuals to cohorts based on maturity (under 5 years, 5-8 years, over 8 years), leverage (less than 15% to greater than 55%), ratings (AAA-AA to B-C), trading volume, and betas on the S&P 500 and the VIX_t. After assigning the residuals to these 18 or 15 cohorts depending on the cohorts, I compute an average residual and extract principal components from the covariance matrix. I report the variance explained by the first and second principal components (PC1 and PC2) for each grouping, comparing baseline results and those including inflation risk proxies. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004–2021.

Group 1	Group 2	Inflation Risk	PC1	PC2	FVE
Time to Maturity	Leverage	No	0.708	0.082	
		Yes	0.656	0.095	0.267
Time to Maturity	Rating	No	0.659	0.111	
		Yes	0.614	0.123	0.269
Time to Maturity	Volume	No	0.748	0.074	
		Yes	0.695	0.087	0.281
Time to Maturity	Market Beta	No	0.664	0.085	
		Yes	0.611	0.097	0.251
Time to Maturity	VIX Beta	No	0.610	0.104	
		Yes	0.553	0.116	0.239

Table VII: **Extended Sample**

For each industrial bond i with at least 25 monthly observations of yield spread changes $\Delta YS_{i,t}$, in columns (1) to (5) I estimate the model

$$\Delta YS_{i,t} = \alpha_i + \beta_i^T \Delta S_{i,t} + \theta_i^T \Delta I_{i,t} + v_{i,t},$$

where $\Delta S_{i,t}$ represents structural model variables. Panel A presents average coefficients, t-statistics, mean and median adjusted R^2 values, and sample sizes. Panel B details a principal component analysis on the residuals, reporting the variance explained by the first two principal components and total unexplained variance. Panel C includes R^2 values, F-statistics, and p-value from a Wald-test of the time-series regression of PC1 on inflation risk proxies. Panel D estimates fixed effects regressions where the t-statistics are clustered at bond and month levels as in Table III. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004-2024.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Individual Bond Regressions								
$\Delta E[\mu^S]_{i,t}$		-0.326			-0.305	-0.274	-0.257	-0.219
		(-32.405)			(-32.257)	(-27.866)	(-26.119)	(-22.659)
$\Delta\sigma^S_{i,t}$			1.375		1.225	1.023	0.949	0.426
			(40.560)		(38.010)	(33.399)	(30.795)	(13.803)
ΔCor^{SB}_t				0.186	0.129	0.164	0.178	0.205
				(16.494)	(12.206)	(15.246)	(16.044)	(18.000)
CDGM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FN	No	No	No	No	No	Yes	Yes	Yes
HKS	No	No	No	No	No	No	Yes	Yes
EHL	No	No	No	No	No	No	No	Yes
Mean R^2	0.316	0.334	0.364	0.314	0.378	0.420	0.431	0.449
Median R^2	0.325	0.343	0.376	0.327	0.386	0.435	0.448	0.463
Obs.	580208	580208	580208	580208	580208	580208	580208	580208
Bonds	8327	8327	8327	8327	8327	8327	8327	8327
Panel B: Principal Component Analysis								
FVE		0.157	0.174	0.040	0.328	0.268	0.262	0.241
PC1	0.794	0.753	0.742	0.787	0.691	0.689	0.675	0.649
PC2	0.063	0.070	0.076	0.064	0.085	0.089	0.093	0.104
UV	0.770	0.649	0.636	0.739	0.518	0.429	0.392	0.332
Panel C: Time-Series Regression of PC1 on Inflation Risk Proxies								
Adj. R^2					0.223	0.163	0.144	0.102
R^2		0.116	0.179	0.014	0.232	0.173	0.155	0.113
F-stat		31.866	52.630	3.501	24.232	16.749	14.659	10.156
p-value		0.000	0.000	0.063	0.000	0.000	0.000	0.000
Obs.		244	244	244	244	244	244	244
Panel D: Fixed Effects Regressions								
$\Delta E[\mu^S]_{i,t}$		-0.435			-0.351	-0.339	-0.305	-0.283
		(-3.444)			(-3.968)	(-3.752)	(-3.747)	(-3.864)
$\Delta\sigma^S_{i,t}$			1.538		1.298	1.121	1.042	0.641
			(3.602)		(3.844)	(4.177)	(3.910)	(3.230)
ΔCor^{SB}_t				0.126	0.067	0.074	0.092	0.107
				(1.226)	(0.856)	(0.913)	(1.170)	(1.579)
CDGM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FN	No	No	No	No	No	Yes	Yes	Yes
HKS	No	No	No	No	No	No	Yes	Yes
EHL	No	No	No	No	No	No	No	Yes
Adj. R^2	0.147	0.163	0.165	0.147	0.176	0.180	0.186	0.195
R^2	0.159	0.175	0.177	0.159	0.187	0.192	0.197	0.207

Table VIII: **Model Parameters**

This table lists the parameters used to examine how yield spreads relate to inflation risk. I fix all parameters except for expected inflation (μ_P), inflation volatility (σ_P) and the correlation between inflation and asset growth ($\rho_{A^r,P}$). I uniformly draw these parameters in reasonable intervals.

Name	Symbol	Value
Initial Price Level	P_0	1
Initial Asset Value	A_0	100
Stickiness Parameter	ϕ	0.40
Refinancing Intensity	m	0.125
Firm-Specific Volatility	σ_{A_r}	0.30
Real Risk-Free Rate	r_r	0.04
Tax Rate	τ_{tax}	0.35
Recovery Rate	R	0.50
Expected Inflation	μ_P	$\mathscr{U}[-0.02, 0.10]$
Correlation Inflation Asset Growth	$\rho_{A^r P}$	$\mathscr{U}[-1, 1]$
Inflation Volatility	σ_P	$\mathscr{U}[0.005, 0.10]$

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Internet Appendix for:

”Inflation Risk and Yield Spread Changes”

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Internet Appendix for:
”Inflation Risk and Yield Spread Changes”

Diego Bonelli

This Internet Appendix contains supplemental material for the article ”Inflation Risk and Yield Spread Changes”.

Section *A* details the procedure for seasonal adjustment of swap and TIPS rates. Section *B* details the construction of the TRACE to CRSP linking table. Section *C* presents the main model solution and alternative structural models motivating the effect of inflation risk. Section *D* and *E* present additional figures and tables.

- Figures IA.1 and IA.2 present additional plots of swap rates.
- Figures IA.3, IA.4 and IA.5 present plots of heterogeneity implications of the model.
- Figure IA.6 presents model simulation of all models discussed in Section *C*.
- Figure IA.7 presents additional heterogeneity tests consistent with the alternative structural models discussed in Section *C*.
- Tables IA.1 and IA.2 report replication tables of CDGM.
- Table IA.3 presents heterogeneity regressions.
- Table IA.4 presents time-series regressions including all bonds regardless of industry, size, or type of bond.
- Table IA.5 presents time-series regressions including only bonds which trade during the last trading day of the month as in Friewald and Nagler (2019).
- Table IA.6 presents all model parameters needed by all models.

A. Seasonal Adjustment of Swap and TIPS rates

TIPS and zero-coupon inflation swaps are both indexed to the non-seasonally adjusted U.S. CPI index, thus seasonal patterns in inflation must be taken into account when matching with corporate bond cash flows for swap maturities that include fractional years (e.g., 7.5 years). I adjust swap and TIPS rates following the procedure of Fleckenstein, Longstaff and Lustig (2014). Specifically, I fit a standard cubic spline through the quoted maturities of both swaps and TIPS using a grid size of one month. I then estimate seasonal components in inflation from the monthly non-seasonally adjusted U.S. CPI index (CPI-U NSA) series between January 1980 and December 2021 by estimating a regression of monthly log changes in the CPI index on month dummies. I obtain an estimate of the seasonal effect in each month. I normalize these seasonal factors so that their product is unity, thus, by construction, there will be no seasonal adjustment for full-year maturities. Next, monthly forward rates are constructed from the interpolated rates, and multiplied by the corresponding adjustment factor. Lastly, I obtain seasonally adjusted rates by converting forward rates into spot rates. As suggested by Fleckenstein, Longstaff and Lustig (2014), since the interpolated rates would then be sensitive to short-term inflation assumptions, I do not interpolate or adjust maturity shorter than the quoted ones, i.e., one year for the swaps and two years for the TIPS, but instead use the shortest quoted maturity rate.

B. Linking Academic TRACE to CRSP

I create a linking table to match TRACE CUSIPs to CRSP permco, accounting for firm mergers, delistings, and splits. First, I merge TRACE with Mergent FISD to obtain issuer and parent CUSIPs. For the CRSP merge, I rely on 6-digit CUSIPs and the TRACE-reported trading symbol, which corresponds to a firm's ticker.

I begin by matching CRSP to TRACE using issuer CUSIPs, tracking the issuing firm forward through the CRSP delisting table to account for mergers or spin-offs. Trading symbols help resolve cases where a bond corresponds to multiple firms on the same date, prioritizing matches where the TRACE trading symbol aligns with the CRSP company symbol.

For unmatched bonds, I match them to CRSP firms using parent CUSIPs. By tracing the parent firm back in time to the bond's offering date and utilizing trading symbols, I identify the correct firm path. First, I ensure the path reaches the first symbol match before other firms, and if multiple firm-date matches occur, I prioritize matches where the TRACE trading symbol aligns with the CRSP company symbol at the time. If no valid match exists, I use the symbol match at any point, provided no alternative matches exist.

Next, I match firms using trading symbols, requiring that symbols are active simultaneously in both CRSP and TRACE databases. Matches are valid only when dates overlap, and the longest period of valid symbol matches is retained. After removing six instances of multiple firm-bond matches, I match the remaining bonds using company names, first matching the issuing firm from FISD with CRSP at the offering date, and then matching parent firm names for any remaining bonds.

C. Model Solution

Let A_t^r and P_t denote the firm's real asset and price index processes, respectively. Define $A_t^n = A_t^r P_t^{\phi}$ as the nominal asset price, where $0 < \phi \leq 1$ captures the sensitivity of nominal asset growth to inflation. I assume that both A_t^r and P_t^{ϕ} are Geometric Brownian processes under the $\boldsymbol{P}$ measure:

$$\frac{dA_t^r}{A_t^r} = \mu_{A^r} d_t + \sigma_{A^r} dW_t^{P,A^r} \qquad A_0^r > 0, \tag{IA.1}$$

$$\begin{aligned} \frac{dP_t^{\phi}}{P_t^{\phi}} &= \phi\left[\mu_P + \frac{1}{2}(\phi-1)\sigma_P^2\right] d_t + \phi\sigma_P dW_t^{P,P} \qquad P_0^{\phi} > 0, \\ &= \bar{\mu}_P d_t + \bar{\sigma}_P dW_t^{P,P} \end{aligned} \tag{IA.2}$$

Here, μ_{A^r} and $\bar{\mu}_P$ are the constant drift rates, σ_{A^r} and $\bar{\sigma}_P$ are the constant volatilities, and W_{A^r} and W_P are the Wiener processes of the respective stochastic variables. Since risk-free bonds are different in real and nominal terms, the risk-neutrality concept also varies with the pricing denomination (i.e., in either real consumption baskets or nominal dollars). In order to price a real asset in nominal terms, one needs the real asset's dynamics under the nominal measure. To do so, I draw from the foreign exchange literature and use the technique called quanto adjustment or quanto prewashing. Since A_t^n and P_t can be considered as price processes in the nominal world, under the nominal risk-neutral measure $\mathbb{Q}^n$, their drift rates are

$$\delta_{A^n}^n = r_r + \bar{\mu}_P, \qquad \delta_P^n = \bar{\mu}_P, \tag{IA.3}$$

respectively. The reciprocal of P_t can be considered as the real price of one unit of the nominal good. The drift rate of A_t^r and $1/P_t$ under the real risk neutral measure $\mathbb{Q}^r$, are given by

$$\delta_{A^r}^r = r_r, \qquad \delta_{1/P}^r = -\bar{\mu}_P, \tag{IA.4}$$

respectively. I then find $\delta_{A^r}^n$, that is, the drift rate of the price process of the real-denominated asset A^r under the nominal risk neutral measure $\mathbb{Q}^n$. Let the dynamics of A_t^r under $\mathbb{Q}^n$ be governed by

$$\frac{dA_t^r}{A_t^r} = \delta_{A^r}^n d_t + \sigma_{A^r} dW_t^{n,A^r}, \tag{IA.5}$$

where the $\mathbb{Q}^n$-Brownian processes dW_t^{n,A^r}, and $dW_t^{n,P}$ have a correlation of ρ_{A^rP}. Since $A_t^n = A_t^r P_t^{\phi}$, we then have

$$\delta_{A^n}^n = \delta_{A^r}^n + \delta_P^n + \rho_{A^rP}\bar{\sigma}_P\sigma_{A^r}, \tag{IA.6}$$

and then

$$\delta_{A^r}^n = \delta_{A^n}^n - \delta_P^n - \rho_{A^rP}\bar{\sigma}_P\sigma_{A^r}. \tag{IA.7}$$

Under the nominal risk neutral measure $\mathbb{Q}^n$, the process follows:

$$\frac{dA_t^r}{A_t^r} = (r_r - \rho_{A^rP}\bar{\sigma}_P\sigma_{A^r})dt + \sigma_{A^r} dW_t^{n,A^r}. \tag{IA.8}$$

Since $A_t^n = A_t^r P_t^{\phi}$ from Ito's lemma:

$$\begin{aligned}\frac{dA_t^n}{A_t^n} &= \left(r_r - \rho_{A^rP}\bar{\sigma}_P\sigma_{A^r} + \bar{\mu}_P + \rho_{A^rP}\bar{\sigma}_P\sigma_{A^r}\right)d_t + \sigma_{A^r}dW_t^{n,A^r} + \bar{\sigma}_P dW_t^{n,P} \\ &= (r_r + \bar{\mu}_P)d_t + \sigma_{A^r}dW_t^{n,A^r} + \bar{\sigma}_P dW_t^{n,P}.\end{aligned} \tag{IA.9}$$

Defining the new variance $\sigma_{A^n}^2$ as

$$\sigma_{A^n}^2 = \sigma_{A^r}^2 + \phi^2\sigma_P^2 + 2\phi\rho_{A^rP}\sigma_{A^r}\sigma_P, \tag{IA.10}$$

the nominal asset process follows

$$\frac{dA_t^n}{A_t^n} = \left[r_r + \phi(\mu_P + \frac{1}{2}(\phi - 1)\sigma_P^2)\right]dt + \sigma_{A^n}dW_t^{n,A^n}. \tag{IA.11}$$

The firm commits to a stationary debt structure by issuing consol bonds to optimally set its total debt D through a constant coupon rate C. Following Leland (1998), the firm continuously retires a fixed fraction mP of its outstanding debt at par, where P represents the total face (book) value of debt and m denotes the refinancing intensity, where $0 < m \leq 1$. The retired debt is immediately replaced by newly issued debt with identical maturity, coupon, principal, and seniority, ensuring a constant rollover process.

Debt issuance provides a tax advantage $\tau_{tax}C$ but increases bankruptcy costs borne by equity holders. The coupon flow needs to be paid either with cash flow plus the tax advantage of debt or out of the equity holders' own pockets. Default occurs when equity holders deem the firm's asset value too low to justify further payouts. Upon liquidation, debt holders receive the residual value of the firm after accounting for bankruptcy costs, determined by the recovery rate, R.

Equity holders are the residual claimants on the firm's cash flows. Consequently, the equity value, E, is determined as the difference between the levered firm value, v, and the debt value, D. If A_t^n declines to a critical endogenous threshold, A_B^n, equity holders default. Define τ the first time the assets hit A_B^n

$$\tau = \inf\{t \mid A_t^n \leq A_B^n\}. \tag{IA.12}$$

Let r_n be equal to $r_r + \phi(\mu_P + \frac{1}{2}(\phi - 1)\sigma_P^2)$. The value of a unit claim at default is

$$\begin{aligned}P_B(A^n) &= \left(\frac{A^n}{A_B^n}\right)^{-\gamma}, \\ \gamma &= \frac{r_n - \frac{\sigma_{A^n}^2}{2} + \sqrt{(r_n - \frac{\sigma_{A^n}^2}{2})^2 + 2(r_n + m)\sigma_{A^n}^2}}{\sigma_{A^n}^2}.\end{aligned} \tag{IA.13}$$

The debt value follows

$$D(A^n; A_B^n, P, C) = \frac{(C + mP)}{(r_n + m)}\left[1 - P_B(A^n)\right] + RA_B^n P_B(A^n), \tag{IA.14}$$

where the first term on the right hand side is the value of the coupon flow up until time τ and the second term is the recovery value in case of bankruptcy. The total value of the firm, v, equals its asset value A^n, plus the value of tax benefits, less the value of bankruptcy costs: $v = A^n + TB - BC$. Define as $x = \gamma$ when $m = 0$. Then, the present value of bankruptcy costs is

$$BC(A^n;A^n_B) = (1-R)A^n_B\left(\frac{A^n}{A^n_B}\right)^{-x}. \tag{IA.15}$$

The value of the coupon flow up until time τ may be expressed as $(C/r_n)(1-(\frac{A^n}{A^n_B})^{-x})$, thus implying a tax advantage of debt

$$TB(A^n;A^n_B) = \frac{\tau_{tax}C}{r_n}\left[1-\left(\frac{A^n}{A^n_B}\right)^{-x}\right]. \tag{IA.16}$$

The first term of the debt value is the value of the coupon paid until time τ and the second term is the recovery value in bankruptcy. Given that the firm only has equity and debt outstanding, its value is

$$\begin{aligned} v(A^n;A^n_B,P,C) &= E(A^n;A^n_B,P,C) + D(A^n;A^n_B,P,C) \\ &= A^n + TB(A^n;A^n_B,C) - BC(A^n;A^n_B). \end{aligned} \tag{IA.17}$$

Given that $E = v - D$, the equity value equals

$$\begin{aligned} E(A^n;A^n_B,P,C) =& A^n + \frac{\tau_{tax}C}{r_n}\left[1-\left(\frac{A^n}{A^n_B}\right)^{-x}\right] - (1-R)A^n_B\left(\frac{A^n}{A^n_B}\right)^{-x} \\ & - \frac{(C+mP)}{(r_n+m)}\Big[1-P_B(A^n)\Big] - RA^n_BP_B(A^n). \end{aligned} \tag{IA.18}$$

The initial owners of the assets choose a level of debt that maximizes the firm total value. Since equity owners have a limited-liability asset, they never allow equity value to become negative but rather choose to stop paying coupons and force the firm into bankruptcy. Thus, the optimal default-triggering level satisfies the "smooth-pasting" condition

$$\frac{d}{dA^n}E(A^n;A^n_B,P,C)|_{A^n=A^n_B} = 0, \tag{IA.19}$$

which is solved for $A^n_B = A^n_B(C*)$ where

$$A^n_B(C*) = \frac{\frac{\gamma(C+mP)}{r_n+m} - \frac{\tau_{tax}Cx}{r_n}}{(1+(1-R)x+R\gamma)}. \tag{IA.20}$$

Plugging this solution into IA.14 yields a closed form solution for total debt value, given coupon C and principal value P. When debt is initially issued, there is typically an additional constraint linking market value, coupon, and principal: the coupon is set such that the market value of debt, D, equals its principal value, P (i.e., the debt is issued at par). This constraint requires C to be the smallest solution to the equation

$$D(A^n; A_B^n, P, C) = P. \tag{IA.21}$$

At time $t = 0$, the initial owners maximize the total firm value by choosing the optimal coupon C^*:

$$C^* = \arg\max_C \nu(A^n; A_B^n(C*), P(C), C) \tag{IA.22}$$

where C^* must be obtained numerically. Therefore, yield spreads are given by

$$y - r_n = \frac{C*}{D(A^n; A_B^n(C*), C*, P*)} - r_n. \tag{IA.23}$$

A. Additional Structural Models

In this section, I study additional structural models, namely the Leland (1994) model, Merton (1974) model and two versions of the Black and Cox (1976) model, while retaining closed-form solutions. The starting point of the models is the nominal asset value under the $\mathbb{Q}^n$ measure:

$$\frac{dA_t^n}{A_t^n} = \left[r_r + \phi(\mu_P + \frac{1}{2}(\phi - 1)\sigma_P^2)\right]dt + \sigma_{A^n} dW_t^{n,A^n}, \tag{IA.24}$$

where

$$\sigma_{A^n}^2 = \sigma_{A^r}^2 + \phi^2\sigma_P^2 + 2\phi\rho_{A^rP}\sigma_{A^r}\sigma_P. \tag{IA.25}$$

A.1. Leland (1994)

The firm issues consol bonds to optimally set debt D through a constant coupon rate C, making the firm's claims "perpetual" in the sense that conditional on not defaulting, no maturity date is set. Debt issuance provides a tax advantage $\tau_{tax}C$ but increases bankruptcy costs borne by equity holders. The coupon flow needs to be paid either with cash flow plus the tax advantage of debt or out of the equity holders' own pockets or by issuing new equity. Default occurs when equity holders deem the firm's asset value too low to justify further payouts. Upon liquidation, debt holders receive the residual value of the firm after accounting for bankruptcy costs, determined by the recovery rate, R. Define A_B^n the level of assets at which default is triggered, and τ the first time the assets hit A_B^n

$$\tau = \inf\{t \mid A_t^n \leq A_B^n\}. \tag{IA.26}$$

Let r_n be equal to $r_r + \phi(\mu_P + \frac{1}{2}(\phi - 1)\sigma_P^2)$. Following Leland (1994), the value of a claim of 1 at the default boundary is

$$\begin{aligned} P_B(A^n) &= \left(\frac{A^n}{A_B^n}\right)^{-\gamma_1}, \\ \gamma_1 &= \frac{r_n - \frac{\sigma_{A^n}^2}{2} + \sqrt{(r_n - \frac{\sigma_{A^n}^2}{2})^2 + 2\sigma_{A^n}^2 r_n}}{\sigma_{A^n}^2}. \end{aligned} \tag{IA.27}$$

The present value of bankruptcy costs is

$$BC(A^n; A_B^n, C) = (1 - R)A_B^n \left(\frac{A^n}{A_B^n}\right)^{-\gamma_1}, \tag{IA.28}$$

where R is the recovery rate in bankruptcy. The value of the coupon flow up until time τ may be expressed as $(C/r_n)(1 - P_B(A^n))$, thus implying a tax advantage of debt and a value of debt of

$$TB(A^n; A_B^n, C) = \frac{\tau_{tax}C}{r_n}\Big[1 - P_B(A^n)\Big], \tag{IA.29}$$

$$D(A^n; A_B^n, C) = \frac{C}{r_n}\Big[1 - P_B(A^n)\Big] + RA_B^n P_B(A^n), \tag{IA.30}$$

where τ_{tax} is the corporate tax rate. The first term of the debt value is the value of the coupon paid until time τ and the second term is the recovery value in bankruptcy. Given that the firm only has equity and debt outstanding, its value is

$$\begin{aligned} \nu(A^n; A_B^n, C) &= E(A^n; A_B^n, C) + D(A^n; A_B^n, C) \\ &= A^n + TB(A^n; A_B^n, C) - BC(A^n; A_B^n, C). \end{aligned} \tag{IA.31}$$

The initial owners of the assets choose a level of debt that maximizes the firm total value. Since equity owners have a limited-liability asset, they never allow equity value to become negative but rather choose to stop paying coupons and force the firm into bankruptcy. Thus the optimal default triggering level satisfies the ”smooth-pasting” condition

$$\frac{d}{dA^n}E(A^n; A_B^n, C)|_{A^n = A_B^n} = 0, \tag{IA.32}$$

which is solved for $A_B^n = A_B^n(C*)$ where

$$A_B^n(C*) = \frac{\gamma_1(1 - \tau_{tax})C}{r_n(1 + \gamma_1)}. \tag{IA.33}$$

Hence, plugging this solution into IA.31, the optimal coupon could be found by maximizing the firm value as a function of C. The solution is

$$C^* = A^n \frac{r_n(1 + \gamma_1)}{\gamma_1(1 - \tau_{tax})} \left(\frac{(1 - \gamma_1)\tau_{tax} + (1 - R)(1 - \tau_{tax})\gamma_1}{\tau_{tax}}\right)^{-\frac{1}{\gamma_1}}. \tag{IA.34}$$

Therefore, yield spreads are given by

$$y - r_n = \frac{C*}{D(A^n; A_B^{n*}, C*)} - r_n. \tag{IA.35}$$

A.2. Merton (1974)

Assume an elementary capital structure of the firm, where the liabilities of the firm only consist of a single debt with nominal face value F^n. The debt has zero coupons and no embedded option features. The firm does not adjust its liabilities during its life, hence creating stickiness in leverage. At maturity of the debt, the payment to the debt holders will be the minimum of the nominal face value F^n and the nominal firm value at maturity A_T^n. Default can be triggered only at maturity and this occurs when $A_T^n < F^n$, that is, the firm's asset value cannot meet its debt claim. The firm is liquidated at zero cost and all the proceeds from liquidation are transferred to the debt holders. Let r_n be equal to $r_r + \phi(\mu_P + \frac{1}{2}(\phi - 1)\sigma_P^2)$. Since the value of risky debt is the value of default-free debt less the present value of expected loss to the debt holders or the value of the put option granted to the issuer, the yield spread is defined as

$$y - r_n = -\frac{1}{(T-t)} \ln\left[1 - \frac{e^{r_n(T-t)} P_t^n(A_t^r, \phi, P_t, T, t)}{F^n}\right], \tag{IA.36}$$

where the put value on real equity with nominal strike is

$$P_t^n(A_t^r, \phi, P_t, T, t) = F^n e^{-r^n(T-t)} N(-\hat{d}_2) - A_t^r P_t^\phi N(-\hat{d}_1), \tag{IA.37}$$

with

$$\hat{d}_1 = \frac{\ln(\frac{A_t^r P_t^\phi}{F^n}) + (r_n + \frac{\sigma_{A^n}^2}{2})(T-t)}{\sigma_{A^n}\sqrt{(T-t)}}, \tag{IA.38}$$

and

$$\hat{d}_2 = \hat{d}_1 - \sigma_{A^n}\sqrt{(T-t)}. \tag{IA.39}$$

A.3. Black and Cox (1976)

The Black and Cox (1976) baseline model extends the Merton (1974) model by allowing defaults to occur prior to the maturity of the bond with an exogenous default boundary. Following Feldhütter and Schaefer (2023), I am focusing on two versions of the Black and Cox (1976) model: the constant growth of debt and the constant debt version.

Constant Growth of Debt

In the version of the Black and Cox (1976) model with constant growth of debt, the level of debt is $F_T^n = F_t^n e^{\lambda(T-t)}$, where $\lambda > 0$. In this case, the level of debt increases deterministically over time, a fact that matches the average behavior of firms. The default occurs the first time that the value of the firm hits the default boundary (from above). I assume that the default boundary is a constant fraction, d, of the face value of debt at the time of default, F_t^n, and so τ, the default time is given by:

$$\tau = \inf\{t \leq T \mid A_t^n \leq d \times F_t^n\}. \tag{IA.40}$$

At maturity, debtors receive F_0^n if the firm is solvent and RF_0^n if the firm has defaulted, where $R < 1$ is the recovery rate. Then the cumulative default probability at time T (See Feldhütter and Schaefer (2023)) is

$$\begin{aligned}
P_T^{\mathbb{Q}^n} =& N\left(\frac{-\ln\left(\frac{dA_t^n}{F_t^n}\right) - a(T-t)}{\sigma_{A^n}\sqrt{(T-t)}}\right) + \exp\left(\frac{-2\ln\left(\frac{dA_t^n}{F_t^n}\right)a}{\sigma_{A^n}^2}\right) \\
& N\left(\frac{-\ln\left(\frac{dA_t^n}{F_t^n}\right) + a(T-t)}{\sigma_{A^n}\sqrt{(T-t)}}\right), \\
a =& \left(r_r + \phi\left[\mu_P + \frac{1}{2}(\phi-1)\sigma_P^2\right] - \lambda - \frac{\sigma_{A^n}^2}{2}\right),
\end{aligned} \tag{IA.41}$$

and thus yield spreads can be defined as

$$y - r_n = -\frac{1}{T}\ln(1-(1-R)P_T^{\mathbb{Q}^n}). \tag{IA.42}$$

Constant Debt

By setting $\lambda = 0$, I obtain a version with constant debt, in which the cumulative default probability is

$$\begin{aligned}
P_T^{\mathbb{Q}^n} =& N\left(\frac{-\ln\left(\frac{dA_t^n}{F_t^n}\right) - a(T-t)}{\sigma_{A^n}\sqrt{(T-t)}}\right) + \exp\left(\frac{-2\ln\left(\frac{dA_t^n}{F_t^n}\right)a}{\sigma_{A^n}^2}\right) \\
& N\left(\frac{-\ln\left(\frac{dA_t^n}{F_t^n}\right) + a(T-t)}{\sigma_{A^n}\sqrt{(T-t)}}\right), \\
a =& \left(r_r + \phi\left[\mu_P + \frac{1}{2}(\phi-1)\sigma_P^2\right] - \frac{\sigma_{A^n}^2}{2}\right),
\end{aligned} \tag{IA.43}$$

and the yield spreads

$$y - r_n = \frac{1}{T}\ln\left[1-(1-R)P_T^{\mathbb{Q}^n}\right]. \tag{IA.44}$$

D. Figures

Figure IA.1: **Time Series of Treasury, TIPS and Swap rates**

The top panel shows the time series of 2-year zero coupon treasury yield, break-even, and inflation swaps. The bottom panel represents the difference between the 2-year zero coupon inflation swap rate and the 2-year TIPS implied zero-coupon break-even inflation yield. Yields are expressed as annual percentages, and the difference is in annual basis points.

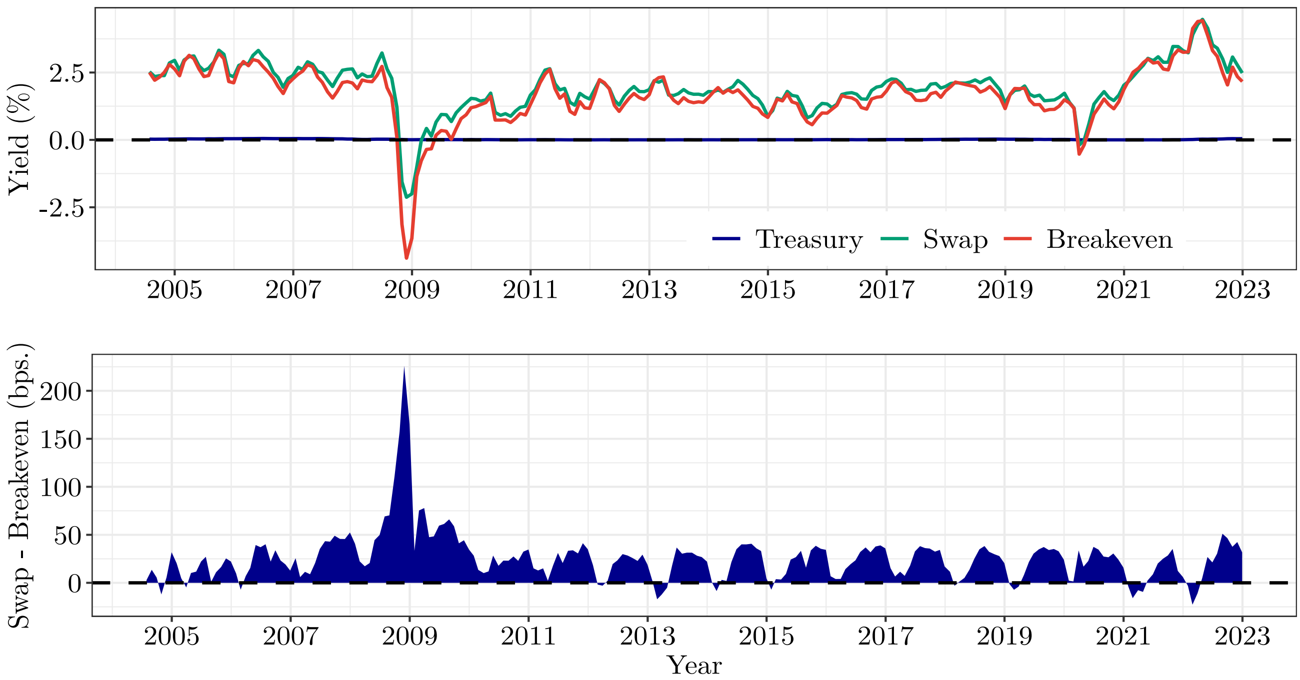
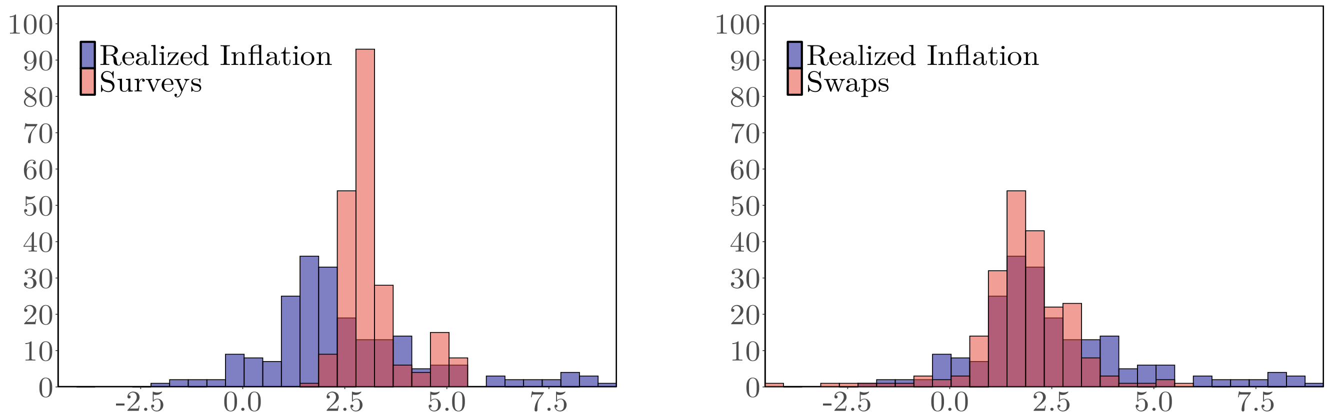


Figure IA.2: **Histogram of Forecasts vs Realized: Surveys and Swaps**

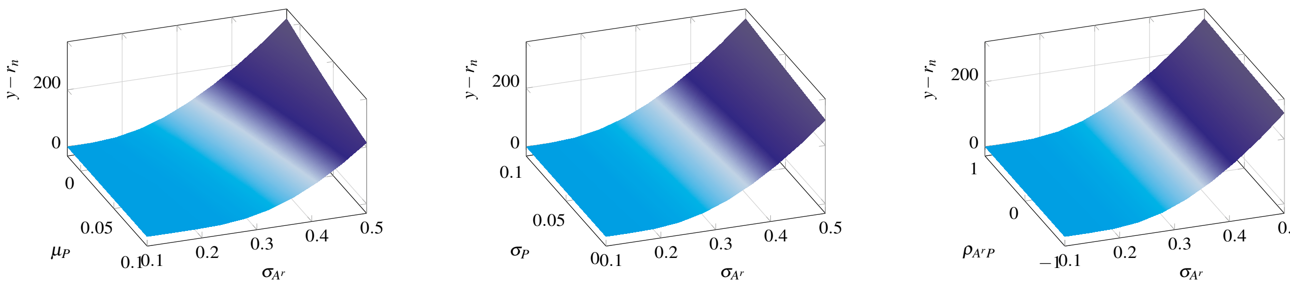
This figure reports the histogram of the forecasts and the 1-year inflation rates. The horizontal axis reflects the forecast or realized inflation in percentage points, while the vertical axis captures the frequency. In blue I report the realizations while in red the expectations. Panel (a) shows the expected price change for one year from Consumer Surveys at the University of Michigan, while Panel (b) the one-year inflation swaps.



(a) Surveys (b) Swaps

Figure IA.3: **Heterogeneity - Asset Volatility**

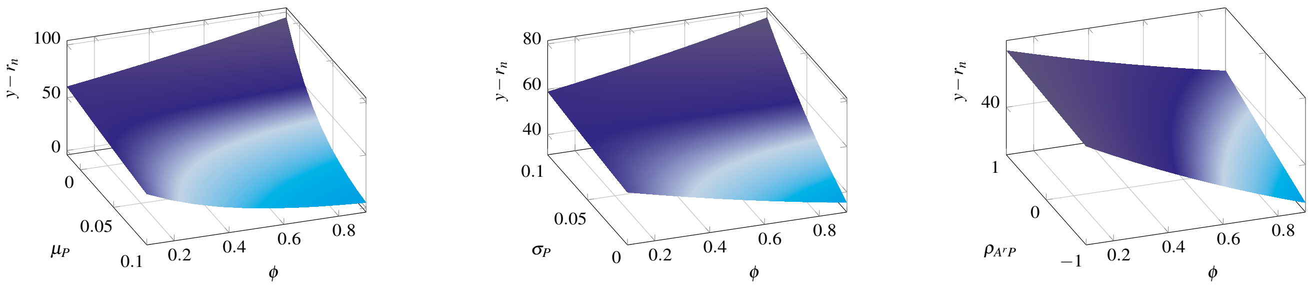
This figure shows the heterogeneity implications of inflation risk. I calibrate the model for each level of real asset volatility from 5 to 40% and for each level of expected inflation rate (μ_P), inflation volatility (σ_P), and the correlation between inflation and assets (ρ_{A^rP}). Expected inflation varies between -2% and 10%, inflation volatility between 0.5% and 10%, and correlation between inflation and real assets between -1 and 1. I fix all parameters according to Table IA.6.



(a) Expected Inflation (b) Inflation Volatility (c) Correlation

Figure IA.4: **Heterogeneity - Cash-Flow Stickiness**

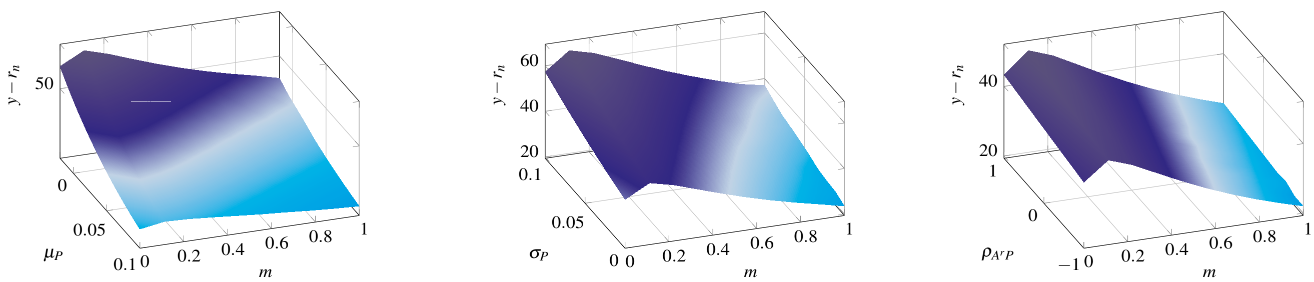
This figure shows the heterogeneity implications of inflation risk. I calibrate the model for each level of cash-flow stickiness (ϕ) from 0.1 to 0.9 and for each level of expected inflation rate (μ_P), inflation volatility (σ_P), and the correlation between inflation and assets ($\rho_{A^r P}$). Expected inflation varies between -2% and 10%, inflation volatility between 0.5% and 10%, and correlation between inflation and real assets between -1 and 1. I fix all parameters according to Table IA.6.



(a) Expected Inflation (b) Inflation Volatility (c) Correlation

Figure IA.5: **Heterogeneity - Refinancing Intensity**

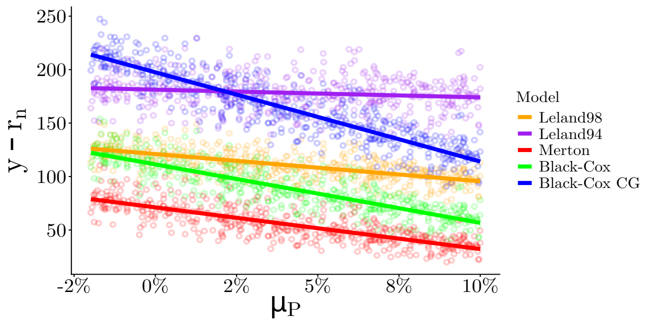
This figure shows the heterogeneity implications of inflation risk. I calibrate the model for each level of refinancing intensity (m) from 0 to 1 and for each level of expected inflation rate (μ_P), inflation volatility (σ_P), and the correlation between inflation and assets ($\rho_{A^r P}$). Expected inflation varies between -2% and 10%, inflation volatility between 0.5% and 10%, and correlation between inflation and real assets between -1 and 1. I fix all parameters according to Table IA.6.



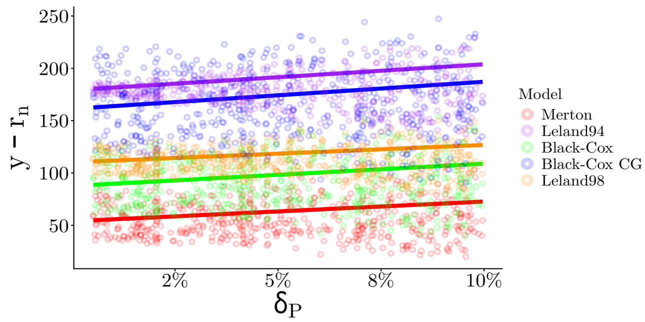
(a) Expected Inflation (b) Inflation Volatility (c) Correlation

Figure IA.6: **Models Simulations**

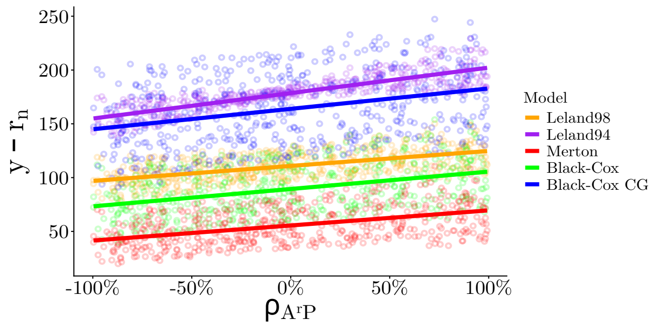
This figure shows the yield spread implications of inflation risk according to the models discussed. I simulate the models 500 times where I fix all parameters except for the expected inflation rate (μ_P), the volatility of inflation (σ_P), and the correlation between inflation and assets (ρ_{A^rP}). I uniformly draw these parameters in reasonable intervals: expected inflation varies between -2% and 10%, inflation volatility between 0.5% and 10%, and correlation between inflation and assets between -1 and 1. I also report regression lines. In Panel (b), the regression line is conditional on the correlation between inflation and real assets being positive. Table IA.6 provides the details about all parameter choices.



(a) Expected Inflation



(b) Inflation Volatility



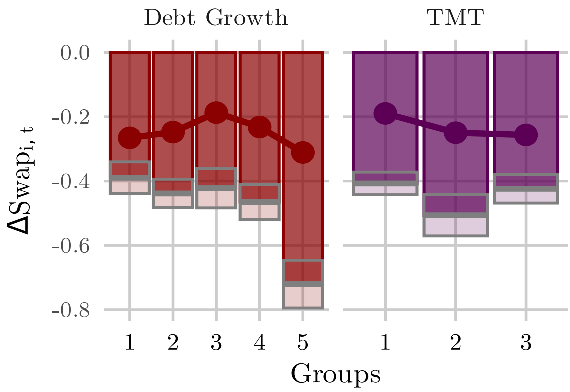
(c) Correlation Inflation Asset

Figure IA.7: **Additional Heterogeneity in Inflation Risk**

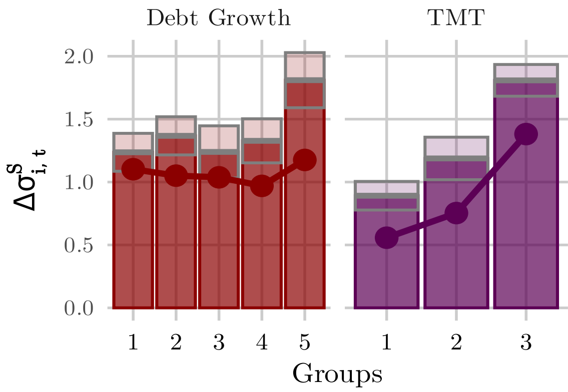
For each industrial bond i with at least 25 monthly observations of yield spread changes $\Delta YS_{i,t}$, I estimate the model:

$$\Delta YS_{i,t} = \alpha_i + \beta_i^T \Delta S_{i,t} + \theta_i^T \Delta I_{i,t} + \nu_{i,t},$$

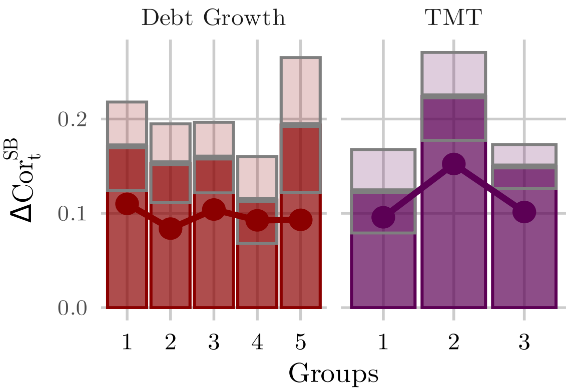
where $\Delta S_{i,t}$ is the vector of structural model variables, and $\Delta I_{i,t}$ refers to the inflation risk proxies. I assign each bond to cohorts based on debt growth and time to maturity (less than five years, five to twelve years, and over twelve years). I plot average coefficients by group with its 5% confidence interval. Panel (a) reports results for expected inflation, Panel (b) for inflation volatility and Panel (c) for the correlation. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004–2021.



(a) Expected Inflation



(b) Inflation Volatility



(c) Correlation

E. Tables

Table IA.1: **Determinants of Yield Spread Changes in Collin-Dufresne, Goldstein and Martin (2001)**

For each industrial bond i with at least 25 monthly observations of yield spread changes, $\Delta YS_{i,t}$, I estimate the model:

$$\Delta YS_{i,t} = \alpha_i + \boldsymbol{\beta}_i^T \boldsymbol{\Delta S}_{i,t} + \varepsilon_{i,t},$$

where $\boldsymbol{\Delta S}_{i,t} := [\Delta Lev_{i,t}, \Delta RF_t, \Delta RF_t^2, \Delta Slope_t, \Delta VIX_t, RM_t, \Delta Jump_t]$ is the vector of the structural model variables, with $\Delta Lev_{i,t}$ as the change in firm leverage, ΔRF_t the change in 10-year Treasury interest rate, ΔRF_t^2 the squared change in the 10-year Treasury interest rate, $\Delta Slope_t$ the change in the slope of the term structure, ΔVIX_t the change in VIX_t index, RM_t the S&P 500 return, and $\Delta Jump_t$ the change in a jump factor based on S&P 500 index options. Panel A reports the average coefficients across bonds, the associated t-statistics, the mean and median adjusted R^2 values, and the numbers of observations and bonds in the sample, respectively. The t-statistics are calculated from the cross-sectional variation over the estimates for each coefficient. That is, each reported coefficient value is divided by the standard deviation of the estimates and scaled by the square root of the number of bonds. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004–2021.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	<15%	15%–25%	25%–35%	35%–45%	45%–55%	>55%	All
Intercept	0.010	0.009	0.018	0.014	0.042	0.066	0.022
	(3.710)	(3.528)	(6.164)	(3.550)	(5.753)	(7.857)	(12.565)
$\Delta Lev_{i,t}$	0.003	0.014	0.016	0.038	0.052	0.115	0.033
	(0.525)	(9.708)	(8.581)	(15.190)	(15.633)	(17.586)	(21.080)
ΔRF_t	-0.301	-0.417	-0.536	-0.750	-0.851	-1.116	-0.594
	(-23.986)	(-35.405)	(-30.876)	(-23.570)	(-14.037)	(-16.622)	(-45.760)
ΔRF_t^2	0.095	0.150	0.067	0.179	0.098	0.190	0.130
	(2.326)	(4.007)	(1.500)	(2.711)	(0.986)	(1.558)	(4.999)
$\Delta Slope_t$	0.303	0.409	0.510	0.694	0.900	0.933	0.558
	(14.558)	(25.690)	(19.724)	(14.151)	(9.695)	(9.847)	(30.213)
ΔVIX_t	0.003	0.005	0.007	0.009	0.008	0.008	0.006
	(1.306)	(6.835)	(5.142)	(5.329)	(2.753)	(2.300)	(8.147)
RM_t	-0.017	-0.020	-0.030	-0.041	-0.063	-0.091	-0.037
	(-10.359)	(-16.416)	(-20.550)	(-19.211)	(-16.355)	(-20.502)	(-38.612)
$\Delta Jump_t$	0.005	0.008	0.011	0.019	0.021	0.031	0.014
	(5.331)	(13.053)	(11.794)	(12.348)	(7.321)	(10.920)	(23.134)
Mean R^2	0.304	0.327	0.349	0.409	0.425	0.392	0.354
Median R^2	0.315	0.350	0.356	0.439	0.457	0.409	0.377
Obs.	81215	124240	97662	57243	32611	56817	449788
Bonds	1261	1900	1288	878	515	984	6826

Table IA.2: **Principal Component Analysis**

For each industrial bond i with at least 25 monthly observations of yield spread changes, $\Delta YS_{i,t}$, I estimate the model:

$$\Delta YS_{i,t} = \alpha_i + \boldsymbol{\beta}_i^T \boldsymbol{\Delta S}_{i,t} + \varepsilon_{i,t},$$

where $\boldsymbol{\Delta S}_{i,t} := [\Delta Lev_{i,t},\ \Delta RF_t,\ \Delta RF_t^2,\ \Delta Slope_t,\ \Delta VIX_t,\ RM_t,\ \Delta Jump_t]$ is the vector of the structural model variables, with $\Delta Lev_{i,t}$ as the change in firm leverage, ΔRF_t the change in 10-year Treasury interest rate, ΔRF_t^2 the squared change in the 10-year Treasury interest rate, $\Delta Slope_t$ the change in the slope of the term structure, ΔVIX_t the change in VIX_t index, RM_t the S&P 500 return, and $\Delta Jump_t$ the change in a jump factor based on S&P 500 index options. I then assign each month's residuals to one of 18 bins defined by three maturity groups (less than five years, five to twelve years, and over twelve years) and six leverage groups (less than 15%, 15%–25%, 25%–35%, 35%–45%, 45%–55%, and greater than 55%) and compute an average residual. I extract the principal components of the covariance matrix of these residuals. For each bin, I report the number of bonds, the number of observations, the principal components loadings, and the ratio of variation of the residual to the total variation. I further report the proportions of the variance of the residuals explained by the first and second principal components, PC1 and PC2, respectively, and the total unexplained variance of the regression in percentage points. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004–2021.

Leverage	Maturity	Bonds	Observations	PC1	PC2	Exp
1	1	913	36914	0.093	0.053	0.011
1	2	642	16399	0.096	0.109	0.011
1	3	702	27902	0.067	0.083	0.007
2	1	1331	51716	0.128	0.119	0.019
2	2	1052	25877	0.136	0.140	0.018
2	3	1151	46647	0.092	0.123	0.010
3	1	877	33402	0.182	0.063	0.034
3	2	785	20118	0.155	0.157	0.023
3	3	813	44142	0.127	0.110	0.017
4	1	622	21038	0.265	-0.013	0.069
4	2	597	15212	0.235	0.260	0.053
4	3	539	20993	0.179	0.172	0.035
5	1	403	13519	0.325	-0.580	0.114
5	2	372	9503	0.310	0.158	0.090
5	3	262	9589	0.192	0.080	0.040
6	1	796	25848	0.437	-0.347	0.177
6	2	721	17301	0.402	-0.236	0.152
6	3	398	13668	0.335	0.497	0.121
Proportion of Variance				0.794	0.052	
Unexplained Variance					1.154	

Table IA.3: **Heterogeneity**

For each industrial bond i with at least 25 monthly observations of yield spread changes $\Delta YS_{i,t}$, I estimate the model:

$$\Delta YS_{i,t} = \alpha_i + \beta_i^T \Delta S_{i,t} + \theta_i^T \Delta I_{i,t} + \nu_{i,t},$$

where $\Delta S_{i,t}$ is the vector of structural model variables, and $\Delta I_{i,t}$ refers to the inflation risk proxies. I assign each bond to cohorts based on average leverage ratios (less than 15%, 15%–25%, 25%–35%, 35%–45%, 45%–55%, and greater than 55%) in Panel A, bond ratings (AAA-AA, A, BBB, BB, and B-C) in Panel B, industry cash-flow flexibility in Panel C, firm refinancing intensity in Panel D, average firm's debt to asset growth in Panel E, time to maturity (less than five years, five to twelve years, and over twelve years) in Panel F, to cohorts based on whether the firm has more than 5% of debt outstanding in floating bonds in Panel G. I include average coefficients, t-statistics (calculated from cross-sectional variation), mean and median adjusted R^2 values, and the number of observations and bonds in the sample. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004–2021.

Panel A: Leverage

Group	$\Delta E[\mu^S]_{i,t}$	$\Delta\sigma^S_{i,t}$	ΔCor^{SB}_t	Mean R^2	Median R^2	Obs.	Bonds
	-	-	-	0.450	0.471	81215	1261
<15%	-0.120	0.549	0.093	0.450	0.471	81215	1261
	(-6.701)	(6.632)	(3.411)				
	-	-	-	0.497	0.515	124240	1898
15%-25%	-0.145	0.598	0.089	0.497	0.515	124240	1898
	(-11.169)	(11.621)	(4.405)				
	-	-	-	0.491	0.503	97662	1287
25%-35%	-0.220	0.708	0.100	0.491	0.503	97662	1287
	(-10.504)	(7.022)	(3.486)				
	-	-	-	0.554	0.591	57243	878
35%-45%	-0.427	0.981	0.167	0.554	0.591	57243	878
	(-12.614)	(5.434)	(4.913)				
	-	-	-	0.555	0.582	32611	514
45%-55%	-0.653	0.714	0.220	0.555	0.582	32611	514
	(-10.828)	(2.956)	(3.373)				
	-	-	-	0.514	0.548	56817	983
>55%	-1.024	1.115	0.087	0.514	0.548	56817	983
	(-11.754)	(3.312)	(0.792)				

(Continued on the next page)

Panel B: Rating							
Group	$\Delta E[\mu^S]_{i,t}$	$\Delta\sigma^S_{i,t}$	ΔCor^{SB}_t	Mean R^2	Median R^2	Obs.	Bonds
	-	-	-	0.382	0.396	35615	546
AAA-AA	-0.048	0.443	0.111	0.382	0.396	35615	546
	(-3.290)	(6.713)	(3.881)				
	-	-	-	0.450	0.471	117438	1865
A	-0.112	0.495	0.075	0.450	0.471	117438	1865
	(-9.991)	(12.041)	(4.550)				
	-	-	-	0.528	0.567	171463	2844
BBB	-0.218	0.566	0.077	0.528	0.567	171463	2844
	(-14.933)	(10.007)	(3.645)				
	-	-	-	0.553	0.585	48983	974
BB	-0.599	0.799	0.335	0.553	0.585	48983	974
	(-10.322)	(4.299)	(4.164)				
	-	-	-	0.502	0.557	42649	891
B-C	-1.145	0.951	0.089	0.502	0.557	42649	891
	(-11.282)	(2.437)	(0.669)				

Panel C: PPI							
Group	$\Delta E[\mu^S]_{i,t}$	$\Delta\sigma^S_{i,t}$	ΔCor^{SB}_t	Mean R^2	Median R^2	Obs.	Bonds
	-	-	-	0.520	0.572	34218	646
Low	-0.196	0.457	0.020	0.520	0.572	34218	646
	(-5.001)	(2.500)	(0.295)				
	-	-	-	0.482	0.512	34650	561
2	-0.200	0.427	0.072	0.482	0.512	34650	561
	(-7.183)	(2.845)	(0.954)				
	-	-	-	0.450	0.474	35035	490
3	-0.208	0.689	0.123	0.450	0.474	35035	490
	(-5.061)	(2.396)	(3.536)				
	-	-	-	0.476	0.491	35051	487
4	-0.224	0.524	0.053	0.476	0.491	35051	487
	(-3.920)	(3.301)	(1.088)				
	-	-	-	0.507	0.549	34925	559
High	-0.452	1.008	0.013	0.507	0.549	34925	559
	(-7.642)	(5.453)	(0.227)				

(Continued on the next page)

Panel D: Refinancing Intensity							
Group	$\Delta E[\mu^S]_{i,t}$	$\Delta\sigma^S_{i,t}$	ΔCor^{SB}_t	Mean R^2	Median R^2	Obs.	Bonds
	-	-	-	0.402	0.430	88982	1477
Low	-0.768	2.108	-0.275	0.479	0.514	88982	1477
	(-19.150)	(16.626)	(-8.221)				
	-	-	-	0.389	0.404	89020	1246
2	-0.457	1.400	-0.191	0.471	0.479	89020	1246
	(-16.417)	(13.874)	(-6.993)				
	-	-	-	0.362	0.387	89068	1278
3	-0.385	1.390	-0.170	0.454	0.470	89068	1278
	(-16.280)	(18.181)	(-8.807)				
	-	-	-	0.319	0.332	89069	1285
4	-0.357	0.880	-0.170	0.405	0.410	89069	1285
	(-15.138)	(12.726)	(-6.497)				
	-	-	-	0.306	0.324	88872	1476
High	-0.480	1.199	-0.104	0.396	0.394	88872	1476
	(-18.096)	(15.530)	(-3.921)				
Panel E: Debt Growth							
Group	$\Delta E[\mu^S]_{i,t}$	$\Delta\sigma^S_{i,t}$	ΔCor^{SB}_t	Mean R^2	Median R^2	Obs.	Bonds
	-	-	-	0.504	0.541	90066	1609
Low	-0.300	0.858	0.052	0.504	0.541	90066	1609
	(-9.769)	(6.746)	(1.182)				
	-	-	-	0.501	0.513	89908	1195
2	-0.295	0.758	0.114	0.501	0.513	89908	1195
	(-11.925)	(8.502)	(3.393)				
	-	-	-	0.498	0.515	89919	1170
3	-0.279	0.665	0.098	0.498	0.515	89919	1170
	(-9.179)	(6.256)	(3.661)				
	-	-	-	0.502	0.527	89946	1295
4	-0.311	0.570	0.098	0.502	0.527	89946	1295
	(-11.173)	(6.397)	(3.506)				
	-	-	-	0.500	0.539	89949	1552
High	-0.558	0.812	0.192	0.500	0.539	89949	1552
	(-11.426)	(3.882)	(3.172)				

(Continued on the next page)

Panel F: Time To Maturity							
Group	$\Delta E[\mu^S]_{i,t}$	$\Delta\sigma^S_{i,t}$	ΔCor^{SB}_t	Mean R^2	Median R^2	Obs.	Bonds
<5	-	-	-	0.440	0.452	165679	3694
	-0.260	0.334	0.148	0.440	0.452	165679	3694
	(-10.644)	(3.885)	(4.065)				
5-8	-	-	-	0.511	0.556	75570	2248
	-0.564	0.361	0.130	0.511	0.556	75570	2248
	(-12.204)	(1.787)	(2.826)				
>12	-	-	-	0.524	0.536	121874	1597
	-0.284	1.223	0.143	0.524	0.536	121874	1597
	(-10.863)	(14.424)	(7.892)				
Panel G: Floating Bonds							
Group	$\Delta E[\mu^S]_{i,t}$	$\Delta\sigma^S_{i,t}$	ΔCor^{SB}_t	Mean R^2	Median R^2	Obs.	Bonds
Float	-	-	-	0.472	0.508	30662	671
	-0.161	0.385	-0.016	0.472	0.508	30662	671
	(-5.172)	(2.615)	(-0.256)				
Fixed	-	-	-	0.498	0.528	399704	6233
	-0.366	0.747	0.118	0.498	0.528	399704	6233
	(-21.566)	(11.185)	(5.914)				

Table IA.4: **Inflation Risk and Yield Spread Changes: All Bonds**

For each industrial bond i with at least 25 monthly observations of yield spread changes $\Delta YS_{i,t}$, I estimate the model

$$\Delta YS_{i,t} = \alpha_i + \beta_i^T \Delta S_{i,t} + \theta_i^T \Delta I_{i,t} + \Gamma_i^T \Delta C_{i,t} + \nu_{i,t},$$

where $\Delta S_{i,t}$ represents structural model variables, $\Delta I_{i,t}$ denotes inflation risk proxies, and $\Delta C_{i,t}$ refers to control proxies from Friewald and Nagler (2019), He, Khorrami and Song (2022) and Eisfeldt, Herskovic and Liu (2024). Panel A presents average coefficients, t-statistics, mean and median adjusted R^2 values, and sample sizes. Panel B details a principal component analysis on the residuals, reporting the variance explained by the first two principal components and total unexplained variance. Panel C includes R^2 values, F-statistics, and p-values from a Wald-test of the time-series regression of PC1 on inflation risk proxies. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004-2021.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Individual Bond Regressions								
$\Delta E[\mu^S]_{i,t}$		-0.446			-0.417	-0.312	-0.318	-0.257
		(-49.297)			(-48.735)	(-33.264)	(-32.401)	(-26.000)
$\Delta\sigma^S_{i,t}$			1.387		1.248	0.945	0.954	0.588
			(47.690)		(44.369)	(29.174)	(26.699)	(14.708)
ΔCor^{SB}_t				0.158	0.084	0.133	0.128	0.115
				(15.362)	(8.972)	(10.295)	(9.080)	(7.765)
Mean R^2	0.340	0.370	0.400	0.339	0.424	0.497	0.507	0.520
Median R^2	0.356	0.388	0.405	0.358	0.430	0.522	0.540	0.557
Obs.	911609	911609	911609	911609	911609	911609	911609	911609
Bonds	14338	14338	14338	14338	14338	14338	14338	14338
Panel B: Principal Component Analysis								
FVE		0.139	0.197	0.027	0.323	0.251	0.263	0.241
PC1	0.768	0.745	0.734	0.773	0.714	0.723	0.716	0.686
PC2	0.130	0.135	0.133	0.123	0.139	0.110	0.115	0.128
UV	0.625	0.538	0.502	0.608	0.423	0.214	0.194	0.153
Panel C: Time-Series Regression of PC1 on Inflation Risk Proxies								
Adj. R^2					0.147	0.089	0.081	0.039
R^2		0.080	0.130	0.006	0.159	0.102	0.094	0.053
F-stat		18.015	30.831	1.185	12.897	7.739	7.045	3.806
p-value		0.000	0.000	0.278	0.000	0.000	0.000	0.011
Obs.		208	208	208	208	208	208	208

Table IA.5: **Inflation Risk and Yield Spread Changes: End of Month Only**

For each industrial bond i with at least 25 monthly observations of yield spread changes $\Delta YS_{i,t}$, I estimate the model

$$\Delta YS_{i,t} = \alpha_i + \beta_i^T \Delta S_{i,t} + \theta_i^T \Delta I_{i,t} + \Gamma_i^T \Delta C_{i,t} + \nu_{i,t},$$

where $\Delta S_{i,t}$ represents structural model variables, $\Delta I_{i,t}$ denotes inflation risk proxies, and $\Delta C_{i,t}$ refers to control proxies from Friewald and Nagler (2019), He, Khorrami and Song (2022) and Eisfeldt, Herskovic and Liu (2024). Panel A presents average coefficients, t-statistics, mean and median adjusted R^2 values, and sample sizes. Panel B details a principal component analysis on the residuals, reporting the variance explained by the first two principal components and total unexplained variance. Panel C includes R^2 values, F-statistics, and p-values from a Wald-test of the time-series regression of PC1 on inflation risk proxies. The sample is based on U.S. corporate bond transaction data from TRACE for the period 2004-2021.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Individual Bond Regressions								
$\Delta E[\mu^S]_{i,t}$		-0.505			-0.448	-0.369	-0.381	-0.314
		(-30.880)			(-29.040)	(-21.175)	(-19.915)	(-16.153)
$\Delta\sigma^S_{i,t}$			1.695		1.489	1.145	1.189	0.637
			(33.128)		(30.066)	(18.240)	(17.400)	(8.227)
ΔCor^{SB}_t				0.224	0.137	0.143	0.143	0.154
				(15.788)	(9.895)	(7.606)	(6.487)	(6.680)
CDGM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FN	No	No	No	No	No	Yes	Yes	Yes
HKS	No	No	No	No	No	No	Yes	Yes
EHL	No	No	No	No	No	No	No	Yes
Mean R^2	0.390	0.420	0.455	0.389	0.477	0.537	0.547	0.558
Median R^2	0.418	0.450	0.479	0.417	0.497	0.578	0.589	0.605
Obs.	236694	236694	236694	236694	236694	236694	236694	236694
Bonds	4356	4356	4356	4356	4356	4356	4356	4356
Panel B: Principal Component Analysis								
FVE		0.145	0.198	0.032	0.334	0.241	0.244	0.215
PC1	0.717	0.665	0.658	0.716	0.615	0.572	0.546	0.523
PC2	0.066	0.074	0.084	0.066	0.094	0.100	0.102	0.104
UV	1.099	0.940	0.882	1.064	0.732	0.416	0.363	0.314
Panel C: Time-Series Regression of PC1 on Inflation Risk Proxies								
Adj. R^2					0.175	0.085	0.073	0.036
R^2		0.091	0.151	0.009	0.187	0.098	0.087	0.050
F-stat		20.716	36.623	1.798	15.685	7.399	6.466	3.546
p-value		0.000	0.000	0.181	0.000	0.000	0.000	0.015
Obs.		208	208	208	208	208	208	208

Table IA.6: **Additional Model Parameters**

This table lists the parameters that I use to examine how yield spreads relate to inflation risk in Figure IA.6. I fix all parameters except for expected inflation (μ_P), inflation volatility (σ_P) and the correlation between inflation and asset growth ($\rho_{A^r,P}$). I uniformly draw these parameters in reasonable intervals.

Name	Symbol	Value
Initial Price Level	P_0	1
Initial Asset Value	A_0	100
Leverage	$\frac{100K}{K+A_0}$	30
Strike Price	K	42.86
Time to Maturity	T	8
Stickiness Parameter	ϕ	0.40
Refinancing Intensity	m	0.125
Firm-Specific Volatility	σ_{A_r}	0.30
Real Risk-Free Rate	r_r	0.04
Tax Rate	τ_{tax}	0.35
Recovery Rate	R	0.50
Default Fraction of Debt	d	1
Debt Growth	λ	0.043
Expected Inflation	μ_P	$\mathscr{U}[-0.02, 0.10]$
Correlation Inflation Asset Growth	ρ_{A^rP}	$\mathscr{U}[-1, 1]$
Inflation Volatility	σ_P	$\mathscr{U}[0.005, 0.1]$

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