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Bonds, Stocks, and Sources of Mispricing

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Abstract

This paper shows that investor sentiment and financial distress jointly drive the equity overpricing underlying market anomalies. In particular, the intersection of high sentiment and rating downgrades of distressed firms characterizes episodes of inflated stock and bond prices to the extent that assets are correctly priced beyond such episodes. Overpricing among stocks and bonds emerges when sentiment-driven investors consistently underestimate the implications of financial distress for high credit risk firms.

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Canonical asset pricing theories assert that risk is correctly priced by rational agents in frictionless markets. However, to the extent that predictable patterns in the cross section of average returns do not reflect compensation for risk exposures, they point to persistent mispricing attributable to either market frictions or biases in investor's expectations. Indeed, financial economists have often questioned the rationality of market participants. For instance, Baker and Wurgler (2006) show that investor sentiment has a significant impact on stock returns, particularly those stocks whose valuations are highly subjective and difficult to arbitrage. Stambaugh, Yu, and Yuan (2012) [henceforth, SYY] further reinforce the role of investor sentiment in asset pricing. They show that anomaly based trading strategies derive their profitability from selling short stocks that are overvalued during periods of high investor sentiment.[1] Independently, Avramov, Chordia, Jostova, and Philipov (2013) [henceforth, ACJP] attribute anomaly profits to short positions in financially distressed firms.

While both SYY and ACJP attribute abnormal anomaly payoffs to undertaking short positions in overpriced stocks, the source of overpricing appears to be very different — market-wide sentiment versus firm-level credit conditions. In SYY, investors become overly optimistic about stocks during periods of high market sentiment and bid their prices too high relative to fundamental values. In ACJP, overpriced, distressed firms that further undergo deteriorating credit conditions display extreme equity characteristics (e.g., particularly high idiosyncratic volatility, dispersion in analysts's earnings forecasts, and negative earning surprises) and are thus placed in the short leg of anomaly based trading strategies. In both studies, predictable cross sectional patterns emerge as inflated equity valuations converge to fundamental values.

This paper aims to reconcile the findings of SYY and ACJP and, more broadly, we attempt to identify the type of pricing errors made by investors. To pursue the analysis, it is essential to account for measures of overpricing and credit risk. Our overpricing measure

[1] Anomalies arise due to predictable patterns in the cross section of returns that remain unexplained by asset pricing models. Examples of predictive firm characteristics include: past stock returns (Jegadeesh and Titman, 1993), unexpected earnings (Ball and Brown, 1968), size and book-to-market ratio (Fama and French, 1992), accruals (Sloan, 1996), credit risk (Dichev, 1998; Campbell, Hilscher, and Szilagyi, 2008; Avramov, Chordia, Jostova, and Philipov, 2009), dispersion in analysts' earnings forecasts (Diether, Malloy, and Scherbina, 2002), capital investments (Titman, Wei, and Xie, 2004), asset growth (Cooper, Gulen, and Schill, 2008), and idiosyncratic volatility (Ang, Hodrick, Xing, and Zhang, 2006), among others.

is computed as in Stambaugh, Yu, and Yuan (2015) and is the average of a stock's decile rankings based on a broad set of anomalies. The measure of firm-level credit risk is the Standard & Poor's long term issuer credit rating available on COMPUSTAT. For robustness, we also use alternative credit risk measures including the Altman's (1968) Z-score and the Failure Probability measure of Campbell, Hilscher, and Szilagyi (2008).

Our overall experiments are based on both stocks and bonds. There are at least two appealing features for incorporating bonds is the type of analysis implemented here. First, prior studies imply conflicting evidence about the direction of mispricing among stocks and bonds. For one, (Bhojraj and Swaminathan, 2009; Chordia, Goyal, Nozawa, Subrahmanyam, and Tong, 2015) suggest that variables identifying mispricing in equity markets also identify mispricing in bond markets. However, Garlappi, Shu, and Yan (2008) and Garlappi and Yan (2011) argue that overvaluation of distressed stocks is attributable to shareholders' ability to extract value during bankruptcy from other stakeholders, potentially from bond holders, which implies that the company's bonds may be undervalued. Thus, while the former studies hypothesize bond overpricing among distressed firms, the latter imply bond underpricing. We do not find support for the hypothesis that shareholders extract value from bondholders during restructuring as both stocks and bonds of distressed firms are overpriced. This evidence points to the possibility that the determinants of stock and bond overpricing are common. Below, we provide more extensive discussion on the determinants of asset mispricing.

Second, bond markets are dominated by institutions.[2] On one hand, Barber, Lee, Liu, and Odean (2009) suggest that institutions tend to be more sophisticated than individuals. On the other hand, a large body of work suggests that institutions and other sophisticated agents are also subject to behavioral biases.[3] Thus, examining whether mispricing obtains in the corporate bond market might provide further clues about whether institutional investors are subject to behavioral biases. We show that while the overpricing in bonds is smaller

[2]Indeed, Edwards, Harris, and Piwowar (2007) document a median trade size of $240,600 in the corporate bond market and find that transaction costs are lower for larger trades suggesting that institutions are likely to be the typical traders in bonds.

[3]See, for instance, Haigh and List (2005), Locke and Mann (2005), Devin G. Pope (2011), Jin and Scherbina (2011), and Cici (2012).

than that in stocks, still, bonds of firms with overpriced equity also deliver significantly lower returns following periods of high sentiment. This suggests that institutions investing in bonds may be susceptible to sentiment. On the other hand, we also find that institutional investors significantly decrease their holdings of distressed stocks prior to downgrades, which lends support to the notion that institutions trading stocks tend to be more sophisticated than retail investors.

While SYY show that high sentiment leads, in general, to equity overpricing, ACJP relate overpricing to financial distress in low-rated firms. We find no mispricing in either bonds or stocks during low sentiment periods. On the other hand, high sentiment periods are not generally populated by overpriced assets. In particular, there is no mispricing among stocks and bonds of low credit risk firms. Thus, high investor sentiment alone cannot give rise to asset overpricing. In the same vein, while ACJP show that overpricing emerges around rating downgrades, we show that downgrades are not larger in size and are not more likely to occur during high versus low sentiment periods. However, the price reaction of stocks and bonds is dramatically different around downgrades following high versus low sentiment periods. Thus, investor sentiment is important and financial distress alone is not sufficient to give rise to overpricing.

Overpricing obtains only during periods of high investor sentiment, among bonds and stocks of high credit risk firms, and only for those firms that experience financial distress. Thus, pricing errors are more likely to point to excess optimism of stock and bond investors in distressed firms, and this excess optimism occurs mainly during high sentiment periods.

When distressed firms are downgraded their characteristics, including trading frictions, information uncertainty, idiosyncratic volatility, and credit risk, become equally extreme in both high and low sentiment states. As pricing errors occur only during high sentiment periods they are not likely to reflect impediments to trading or increasing firm uncertainty. The puzzle then is why are investors (especially retail investors, as noted earlier) optimistic about and purchase distressed stocks, which, on average, continue to perform poorly?

The low returns to the high credit risk distressed firms are not a result of low loadings on the Fama and French (2015) factors. Firm characteristics such as size, book-to-market ratio,

and past returns also do not explain the low returns. We also rule out lottery-type preferences as a source of overpricing.[4] In particular, while equities exhibit unlimited upside, under best circumstances bonds pay coupons and the principal. Even with limited upside, bonds of firms with overpriced equities are also overpriced, which is inconsistent with lottery-type overpricing.

The overall findings here are indeed consistent with biases in investor's expectations. In particular, (Miller, 1977, p.1158) argues that in the presence of heterogenous beliefs and trading frictions rational investors should realize that risky assets are overpriced and hence trade to correct the overpricing. Indeed, in low sentiment periods, we observe just that—there is no under- or overpricing in any credit risk group. However, in high sentiment periods, investors do not appear to correct the overpricing and make one particular type of pricing error: they underestimate the implications of financial distress for high credit risk firms. In fact, bond prices are inflated by sentiment-driven institutions who dominate bond trading. Thus, institutional investors can also be subject to behavioral biases, which in our context amounts to excess optimism about bonds of distressed firms. Upon excluding the stock and bond returns from 12 months before to 12 months after a downgrade from the sample, there is no evidence of mispricing even after during episodes of higher investor sentiment. Excessive optimism during financial distress seems to be driving the anomaly-based trading strategy profits.

The rest of the paper proceeds as follows. Section 1 describes the bond and stock data. Section 2 discusses the results. Section 3 discusses the implications of our results for competing explanations for mispricing. Section 4 concludes.

1. Data

Our analysis combines data from equity and corporate bond markets employing a variety of vendors. We start by describing the individual bond data.

[4]Kumar (2009) documents investor preference for stocks with lottery-like characteristics, such as low price, high idiosyncratic volatility, and positive return skewness, even when such stocks deliver poor average returns. Bailey, Kumar, and Ng (2011) show that behaviorally biased individual investors are influenced by lottery-like features in their investment in mutual funds.

1.1. ***Individual bond data***

Our sample of corporate bonds contains 3.02 million dealer-quote (Lehman, DataStream, Bloomberg) and transaction based (TRACE) bond-month return observations on 72,019 US corporate bonds (an average of 9,857 per month) by 9,096 issuers (an average of 2,206 per month) from January 1986 to June 2011.

Individual corporate bond data are obtained from four databases (coverage in parentheses): the Lehman Brothers Fixed Income Database [Lehman] (1986–1998), DataStream (1990–2011), Bloomberg (1987–2008), and TRACE (2002–2011).[5] DataStream and TRACE provide the majority of recent observations.

While the Lehman database provides bond coverage since 1973, comprehensive issuer-level rating data is available in COMPUSTAT only since 1986. Notably, prior to 1986 bonds in Lehman are predominantly investment grade and there are far fewer bond issues.

From the *Lehman* database, we obtain monthly returns and ratings from January 1986 to March 1998. While most prices in the Lehman database are dealer quotes, some are "matrix" prices, derived from price quotes of bonds with similar characteristics. Jostova, Nikolova, Philipov, and Stahel (2013) [henceforth JNPS] and Gebhardt, Hvidkjaer, and Swaminathan (2005) show that their results are unaffected by the exclusion of matrix prices.

Monthly returns from *DataStream* are computed from the monthly total return index.[6] Bloomberg provides month-end prices and coupons, from which monthly returns are calculated. While Lehman, DataStream, and Bloomberg provide prices based on dealer quotes, TRACE is trade-based. TRACE was introduced in 2002 and by February 2005 TRACE covers more than 99% of the OTC activity in US corporate bonds.[7] While quote-based databases provide month-end prices and returns, trade-based databases provide intraday clean prices, from which returns are calculated as described below. From TRACE, we collect trade prices

[5] Individual bond return data from these databases have been used by Jostova, Nikolova, Philipov, and Stahel (2013) and Chordia, Goyal, Nozawa, Subrahmanyam, and Tong (2015) (except for Bloomberg).

[6] As noted in JNPS, most U.S. corporate bond prices are dealer quotes by market-makers. These data are further augmented with trading prices when available. DataStream starts extensive coverage on individual bond returns in 1990.

[7] See FINRA news release *http://www.finra.org/Newsroom/NewsReleases/2005/P013274.*

and coupon rates, payment dates and frequencies from July 2002 to March 2011 and follow the data cleaning procedure of Bessembinder, Kahle, Maxwell, and Xu (2009), eliminating canceled, corrected, and commission trades.

Return Calculation To compute monthly returns for TRACE, we first compute daily prices as the trade size-weighted average of intraday prices.[8] The month-end price is the last available daily price from the last five trading days of the month.[9] Using this month-end price, we compute monthly holding period returns as:

$$r_{i,t} = \frac{(P_{i,t} + AI_{i,t} + Coupon_{i,t}) - (P_{i,t-1} + AI_{i,t-1})}{P_{i,t-1} + AI_{i,t-1}} \tag{1}$$

where $r_{i,t}$ is bond i's month t return, $P_{i,t}$ is its price at month-end t, $AI_{i,t}$ is its accrued interest at month-end t, and $Coupon_{i,t}$ is any coupon paid between month-ends t-1 and t. Computing accrued interest requires the bond's first coupon date, coupon size, coupon frequency, and day count convention.

If information on these characteristics cannot be found in any of the databases, we make the following assumptions. If the first coupon date is missing, we assume that coupons start accruing from the bond's issuance date, and if the payment frequency is missing, we assume that the bond pays interest semi-annually. If there is no available information on the day count convention used for coupon accrual, we assume that it is 30/360. We have verified that our findings remain unchanged upon limiting the sample to the subset of observations having all of the above information.

The overlap between databases is low—over 90% of observations come from a single data source. When there are bond-month returns available from several sources, we take the return in the following sequence: TRACE, Lehman, DataStream, and Bloomberg, giving precedence to trade-based returns.

[8]This approach is consistent with the findings in Bessembinder, Kahle, Maxwell, and Xu (2009) that a daily price based on trade-size weighted intraday prices is less noisy than the last price of the day.

[9]Using the last price within the 5-day end-of-month interval instead of that on the last day helps increase the number of non-missing monthly observations. If there are no trades in the last five trading days, the trade-based return is missing for that month. The conclusions of the paper are robust to extending/contracting this month-end window.

Our bond data covers only U.S. corporate fixed-coupon bonds denominated in U.S. dollars. We filter out bonds that are convertible, putable, backed by mortgages or other assets, bonds with warrants, bonds with unusual coupons (e.g., step-up, increasing-rate, pay-in-kind, and split-coupons), bonds that are part of unit deals, and preferred shares. We also collect issue date, maturity date, amount outstanding, duration, rating, coupon rate, payment dates, and frequencies. We eliminate observations that are obvious data entry errors, e.g., with negative prices, with maturity dates prior to issuance or trade dates, etc. We also eliminate return outliers above the 99.5th percentile as they appear to be data errors.

1.2. ***Firm-level bond data***

We aggregate bond returns at the company level. Individual bonds are matched to their corresponding equity using historic and current cusips. Only bonds matched to common equity (share code: shrcd=10 and 11) are used. Each month, firm-level bond returns are obtained by equally weighting the returns of all outstanding bonds issued by the firm. This firm-level aggregation produces firm-level bond returns for a total of 3,225 firms (1,138 per month on average). Firm-level bond ratings are also the equally-weighted ratings of all outstanding bonds issued by the firm. Many of the public bonds in our individual bond sample are issued by private firms or do not have publicly traded equity listed on CRSP—these are excluded from the analysis.

Our main analysis is based on firm-level bond returns as we attempt to study the impact of equity and firm-level overpricing on stock and bond prices. For robustness, we have implemented our major experiments using individual bonds. The overall results are qualitatively similar.

1.3. ***Equity and other firm-level data***

Equity data on monthly returns, trading volume, shares outstanding, and month-end prices are extracted from CRSP for all US common stocks listed on NYSE, Amex, and Nasdaq. Delisting returns from CRSP are used whenever stocks are delisted. Stocks priced less than

one dollar at the beginning of the month are excluded from the analysis. In addition, the asset-pricing anomalies used to assess overpricing (see below) require accounting observations from COMPUSTAT and analyst data from I/B/E/S.

1.4. ***Credit risk proxies***

Our analysis examines the impact of overpricing on stocks and bonds using various credit risk measures. The main measure is firm's Standard & Poor's long term issuer credit rating, provided by both COMPUSTAT and RatingsXpress. As defined by S&P, the "long-term issuer credit rating is a current opinion of an issuer's overall creditworthiness, apart from its ability to repay individual obligations. This opinion focuses on the obligator's capacity and willingness to meet its long-term financial commitments (those with maturities of more than one year) as they come due."

In other words, the S&P long-term issuer rating is attached to a firm and not a particular bond issue. We transform the S&P ratings into numeric scores: 1 represents a AAA rating and 22 reflects a D rating.[10] Hence, a higher numeric score reflects higher credit risk. Numeric ratings of 10 or below ($BBB-$ or better) are investment grade (IG), and ratings of 11 or higher ($BB+$ or worse) are high-yield or non-investment grade (NIG).

Our focus on credit risk imposes the restriction of credit rating availability. For robustness, we also examine alternative samples using the Altman's (1968) Z-score or the Failure Probability of Campbell, Hilscher, and Szilagyi (2008)) instead of credit ratings. The overall findings based on these alternative samples are consistent with the ones reported here. As an aside, we find that of all the firms that record bond and stock returns, there are fewer with observations on Z-scores than with issuer credit rating observations. It should be noted that we have also run the analysis using firm-level average bond ratings, rather than issuer credit ratings. The results are similar to those presented throughout the paper.

Bond- (or issue-) specific credit ratings are obtained from Standard and Poor's *RatingXpress*.

[10]The entire list of ratings is as follows: $AAA = 1$, $AA+ = 2$, $AA = 3$, $AA- = 4$, $A+ = 5$, $A = 6$, $A- = 7$, $BBB+ = 8$, $BBB = 9$, $BBB- = 10$, $BB+ = 11$, $BB = 12$, $BB- = 13$, $B+ = 14$, $B = 15$, $B- = 16$, $CCC+ = 17$, $CCC = 18$, $CCC- = 19$, $CC = 20$, $C = 21$, $D = 22$.

RatingXpress provides both issue-specific and issuer-specific ratings. These ratings are supplemented with any additional ratings available in the bond databases. As with firm-level bond returns, firm-level average bond ratings are obtained each month by equally weighting the ratings of all outstanding bonds issued by the firm, for which we have rating data.

1.5. ***Overpricing measure***

Our measure of overpricing is based on anomalies studied by Stambaugh, Yu, and Yuan (2012) and Avramov, Chordia, Jostova, and Philipov (2013). In particular, here is the list of our anomaly-based conditioning variables: price momentum, earnings momentum (SUE), idiosyncratic volatility, analyst dispersion, asset growth, investments, net operating assets, accruals, gross profitability, return on assets, and two variables for net issuance.[11]

As in Stambaugh, Yu, and Yuan (2015) we compute a composite measure per firm as follows. Each month, we sort firms into deciles using anomaly variables specified above. The composite overpricing measure is an equally weighted average of the firm's portfolio rankings based on the individual anomalies, where a high ((low) ranking indicates relative overpricing (underpricing). As noted by Stambaugh, Yu, and Yuan (2015), while each anomaly variable is a noisy proxy for overpricing, the composite measure is likely to reduce this measurement noise.

As we examine the interaction between credit risk and overpricing, our overpricing composite measure excludes three credit risk variables used in SYY and ACJP, namely, failure probability, O-score, and credit rating. While the overall findings in this paper are based on our overpricing measure, in the internet appendix (Table IA.I) we report results using instead the Stambaugh, Yu, and Yuan (2015) overpricing measure. The two measures produce qualitatively similar findings.

[11] Price momentum uses cumulative returns over months $t-2$ to $t-7$, SUE is calculated as in Chordia and Shivakumar (2006) as the latest quarterly EPS announced over the previous 4 months minus the quarterly EPS 4 quarters ago, scaled by the standard deviation of these changes over the past 8 quarters. Analyst dispersion is calculated as the standard deviation of analysts' earnings forecasts for the next fiscal year divided by the absolute value of the consensus forecast, subject to at least 2 analysts following the firm. Idiosyncratic volatility is calculated from the squared daily residuals from regressions of daily stock returns on the Carhart (1997) four factors. The remaining variables are calculated as in Stambaugh, Yu, and Yuan (2012). All accounting-based variables are lagged relative to returns as in Fama and French (1992).

1.6. ***Aggregate variables***

To study the impact of investor sentiment on the profitability of anomalies, we use Baker and Wurgler's monthly and annual sentiment indexes available on Jeff Wurgler's webpage. In particular, $\text{SENT}^{\perp}_{t-1}$ is the year $t-1$ orthogonalized annual sentiment index of Baker and Wurgler (2006) and $\text{SENTm}^{\perp}_{t-1}$ is the month $t-1$ monthly orthogonalized sentiment index of Baker and Wurgler (2007).[12] A stock's overpricing during high and low sentiment is assessed by examining whether its subsequent returns are negative or significantly lower than those of other stocks, i.e., whether its price subsequently corrects. Whenever we use the monthly sentiment index, we consider the following month return as subsequent. Whenever we use the annual sentiment index, we consider the following 12 months of returns as subsequent to the December sentiment level.

The risk adjustment for bond returns is based on the five Fama and French (1993) factors: three equity factors MKT, SMB, and HML, and two bond factors, the term premium [TERM] and the default premium [DEF] factors. MKT, SMB, and HML are obtained from Ken French's webpage. TERM is the spread between the monthly return on 10-year government bonds and the 1-month Treasury Bill (obtained from the Federal Reserve Board of St. Louis' website). DEF the spread between the monthly returns on BBB-rated corporate bonds and 10-year Treasury notes (from Bloomberg). The risk adjustment for stock returns uses the Fama and French (2015) factors which include MKT, SMB, HML, RMW and CMA.

1.7. ***Descriptive statistics***

Our final sample consists of firm-month observations that have data on bond returns, stock returns, and Standard & Poor's long term issuer credit rating. We exclude stocks priced below a dollar at the investment month. The overall filters result in 210,728 firm-month observations of a total of 2,292 firms over the period from January 1986 to June 2011 (306 months). Our sample consists of bond and stock returns for an average of 689 firms per

[12]The sentiment index is based on first principal component of six (standardized) sentiment proxies where each of the proxies has first been orthogonalized with respect to a set of six macroeconomic indicators.

month with a minimum of 265 firms (in January 2000)[13], and a maximum of 1,015 firms (in March 2005).

As the sample is limited by the availability of bond returns and issuer credit ratings, we capture firms the are more liquid and with higher market capitalization. The market capitalization of our sample of firms is, on average, 64% of the market capitalization of all firms listed on CRSP in a given month. For comparison, the market capitalization of CRSP firms having enough data on COMPUSTAT and I/B/E/S to calculate the SYY overpricing measure is 65% of the market capitalization of all CRSP firms. Alternatively, about 70% (91%) of the firms in a given month are above the 50th (20th) NYSE size percentile, i.e., qualifying as 'big' ('big' or 'small' but not 'micro') stocks according to the Fama and French (2008) classification.

Table 1 provides descriptive statistics of our final sample sorted on prior month S&P issuer credit rating. All numbers in the table represent the time-series mean of cross-sectional average characteristics. Our sample has firms from the full spectrum of ratings, from 1=AAA to 22=D, with an average of 9=BBB. The best-rated quintile of firms, C1, has an average rating of 4.62 (A+) with all rated as IG, while the worst, C5, has an average rating of 14.35 (B+) with 96% of the firms rated NIG. In addition, 63% of the firms in C4 are rated NIG. Alternative measures of default risk show monotonically increasing default likelihood along the C1 to C5 groups with a sharp jump in the C5 category. For example, the Failure Probability of C1 to C4 firms ranges between 0.08% and 0.32%, while that of C5 firms is 2.04%. Similarly, the Altman's (1968) Z-score drops monotonically from 0.97 in C1 to 0.54 in C4 and then sharply to 0.18 in C5.

High credit risk firms tend to be smaller, more volatile, less liquid, value firms, with smaller institutional ownership, and covered by fewer analysts who tend to disagree more about their future earnings. Specifically, the market capitalization of C5 firms is $1.35 billion on average, while the corresponding figure for C1 firms is $24.23 billion. C5 firms have a book-to-market ratio of 1.19, while that of C1 is 0.64. The four-factor idiosyncratic volatility of C5 firms is 2.82% per month, more than twice that of C1 firms of 1.20%. C5

[13]Around this period, there are only limited databases offering bond data: Lehman ends in 1998, TRACE starts in 2002, and the coverage of Bloomberg and Datastream is limited.

firms' Amihud's (2002) illiquidity is over 100 times larger than that of C1 firms (57.48 versus 0.53). Institutional ownership increases from 56.15% of shares outstanding in C1 firms to 60.98% in C3, to 60.82% in C4, then drops sharply to 49.52% in C5 firms. Analyst coverage monotonically decreases from 18.89 analysts per firm in C1 to 7.17 analysts in C5. The cross-sectional dispersion in analysts' EPS forecasts is over 10 times higher in C5 than in C1 firms: 0.54 versus 0.05.

High credit risk firms are much more likely to be on the short side of anomaly portfolios, a point consistent with SYY that the short side drives anomalies, and ACJP that high credit risk stocks drive anomalies. For example, C5 firms have the lowest standardized unexpected earnings; SUE=0.05 in C5 versus 1.06 in C1. In fact, 45% of earnings surprises are negative in C5 versus 29% in C1. Moreover, as noted above, C5 firms have the highest idiosyncratic volatility and analyst dispersion. Strategies based on these anomalies would recommend shorting the lowest rated stocks.

High credit risk stocks tend to be overpriced. Our overpricing measure (OV) ranges from the most underpriced (OV=1) to the most overpriced (OV=10) rank based on the 12 conditioning variables noted earlier. C1 firms have an average OV of 4.85, namely they tend to be relatively underpriced with only 27% of C1 firms having OV above 5.5 (the median). In contrast, C5 firms have an average overpricing measure of 6.15 and 74% of them are overpriced (above the median).

High credit risk stocks subsequently earn lower returns, offering additional evidence of overpricing. Returns average 1.03% per month in C1 firms and 0.55% in C5 firms. Considering the high systematic risk of C5 firms, their portfolio alphas are even lower at −0.61% (for the CAPM) and −0.58% (for the Carhart (1997) four-factor model).

Firms typically have more than one bond issue. We average the characteristics across all bond issues of a firm, before averaging across firms and then across months. Notice that the average bond (or issue) rating is very similar to the firm-level (issuer) rating reported at the top of the table. While C5 firms have fewer public bond issues outstanding in a given month (2.67 on average) than C1 firms (12.21 issues per firm), the amount outstanding per issue does not differ much across ratings—it is about $200 million per issue.

Higher credit risk firms tend to issue bonds with lower maturity (possibly because investors are unwilling to lend long-term to riskier firms), which translates into C5 firms having bonds with lower age (4.04 versus 5.71 years), lower time to maturity (7.63 versus 11.38), and lower duration (4.72 versus 6.52 years) than C1 firms. Like equities, bonds of C5 firms are more volatile—their monthly returns exhibit a standard deviation of 4.15% versus 1.93% for C1 firms.

Bond returns of C5 firms are the lowest and also the most volatile. Bond returns increase with credit risk from C1 through C4 categories but then decrease for the C5 firms. Monthly returns average 0.66%, 0.70%, 0.71%, 0.76%, and 0.52%, respectively, for the C1 to C5 firms. Similarly, alphas with respect to the Fama and French (1993) 5-factors (including the three equity factors (MKT, SMB, HML) and two bond factors (TERM and DEF)) are 0.07%, 0.09%, 0.10%, 0.17%, and −0.08%, respectively. Notice that bonds of high credit risk firms are most sensitive to the default factor—C5 firms have a DEF beta of 0.75, which increases monotonically from 0.48 in C1 firms.

2. Results

2.1. ***Mispricing in stocks and bonds***

We first assess the overpricing-return relation among stocks and bonds. We construct ten overpricing portfolios. That is, in each month t, we sort firms into decile portfolios, P1 to P10, based on the overpricing measure, with P10 (P1) denoting the portfolio of most (least) overpriced stocks. We then compute for each portfolio equally weighted month $t+1$ returns for both stocks and bonds. Table 2 reports the time-series average of portfolio returns, along with their t-statistics. It does so for the overall sample as well as for investment-grade [IG] and non-investment grade [NIG] subsamples (keeping the portfolio cutoffs fixed across subsamples).

Starting with stocks, Table 2 confirms that the anomalies-based composite measure captures overpricing. In particular, stocks identified as most overpriced earn significantly lower future returns. The portfolio of most overpriced stocks, P10, earns an insignificant 35 basis

points per month [bpm], while the most underpriced, P1, earns a statistically significant 120 bpm. The P10–P1 return differential is significant at −84 bpm (t-statistic of −2.63). Moreover, consistent with ACJP, the return spread between the most and least overpriced stocks is significant only among NIG stocks at −177 bpm, while for IG stocks the spread is relatively small and statistically insignificant.

Bonds of firms with overpriced equity are also overpriced. The P10–P1 return spread between the most (41 bpm) and least (72 bpm) overpriced bonds is −31 bpm (t-statistic of −3.09). As with stocks, the mispricing in corporate bonds is driven by NIG firms, where the P10–P1 spread is −56 bpm (t-statistic of −3.51). For IG firms the spread is virtually nonexistent. Unreported results using individual bonds, rather than firm-level average bond returns, point to similar bond overpricing.

2.2. ***Overpricing and downgrades***

ACJP show that asset pricing anomalies are driven by high credit risk firms during periods of financial distress. In particular, they show that mispricing in equities emerges in a specific group of stocks—high credit risk stocks— and in a specific time period—when high credit risk firms are in financial distress i.e., around rating downgrades. The also show that mispricing is nonexistent amongst high credit risk firms in stable or improving financial conditions.

Panel A of Table 3 verifies that mispricing, as measured by the composite index, indeed exclusively characterizes high credit risk firms and only in periods of financial distress. Specifically, in each month t, firms are sorted independently into 3×3 portfolios based on the issuer credit rating and overpricing. Portfolio C1 (C3) is comprised of the highest (lowest) rated firms. The table reports the time-series average of the equally weighted cross-sectional mean portfolio return for month $t + 1$. Each panel has four sub-panels—sub-panels 1 and 2 report average firm-level bond returns for month $t + 1$, while sub-panels 3 and 4 report average stock returns for month $t + 1$. Sub-panels 1 and 3 consider all available return observations, while sub-panels 2 and 4 exclude return observations from 12 months before to 12 months after an issuer credit rating downgrade. This 24 month period around a ratings downgrade will be designated as the financial distress period.

Starting with stocks, observe from Panel A.3 that the high–low overpricing spread increases monotonically as credit risk rises. Equity mispricing is indeed driven by stocks belonging to C2 and C3 groups. For instance, among the highest credit risk tercile, C3, the most overpriced stocks underperform the most underpriced stocks by 71 bpm (t-statistic of 3.07) in the subsequent month. Among the tercile of firms with the lowest credit risk, C1, stocks with the lowest and highest overpricing measure earn virtually identical returns.

However, such mispricing among high credit risk stocks characterizes only downgrade periods. The evidence reported in Panel A.4 shows that after excluding 12 months of returns before and after downgrades, over- and underpriced firms of all rating groups earn about the same returns, 146 bpm versus 152 bpm in the case of the C3 firms. Hence, mispricing is limited to high credit risk stocks and only in periods of financial distress. Perhaps unsurprisingly, upon excluding observations around rating downgrades, the returns of each of the nine portfolios in Panel A.4 become systematically higher than those reported in Panel A.3, when all observations are included.

It is also evident that mispricing in bond markets follows similar patterns — it is limited to high credit risk firms and only in periods of financial distress. Observe from Panel A.1 that among C3 firms, bonds of overpriced firms underperform bonds of underpriced firms by 25 bpm (t-statistic of 4.22). This mispricing is not present among the better quality C1 and C2 firms. For the C1 group, bonds of overpriced firms have about the same returns as underpriced firms, 69 versus 66 bpm. Even among C3 firms, mispricing is absent outside episodes of financial distress as evident from Panel A.2. Notice also from Panels A.1 and A.3 that when stocks are relatively underpriced, both the bond and stock returns of the low rated, C3 firms, are higher than those of the high rated, C1 firms, 84 versus 66 bpm in the case of bonds and 143 versus 108 bpm for stocks. This accords with the risk return trade-off that the riskier assets should command, on average, higher returns.

Panel B of Table 3 reports results based on risk-adjusted returns (i.e., Fama and French (1993) 5-factor portfolio alphas).[14] The overall findings are similar to those in Panel A,

[14]Portfolio returns are risk-adjusted by regressing each portfolio's raw bond returns on the Fama and French (1993) five factors (including the three equity factors (MKT, SMB, HML) and two bond factors (TERM and DEF)) and stock returns on the Fama and French (2015) (MKT, SMB, HML, RMW, CMA),

i.e., stock and bond mispricing is limited to high credit risk firms and only in periods of financial distress. Among high credit risk firms, the risk-adjusted return differential between overpriced and underpriced firms is −44 bpm for stocks and −30 bpm for bonds. Spreads turn small and insignificant when periods around downgrades are excluded.

Results based on characteristic-adjusted bond and stock returns are also similar (see Panel C). Stock returns are characteristic-adjusted by size and the book-to-market ratio. Bond returns are characteristic-adjusted by the amount outstanding and duration (results are virtually identical if the adjustment considers age and duration). The characteristic-adjusted return of a stock (bond) is its month-t return minus the value-weighted average return of stocks (bonds) belonging to the same characteristic group, determined by a 3×3 independent sort on the two characteristics.

Panel B of Table 3 also shows that the credit risk effect—the low returns of high versus low credit risk stocks (an apparent violation of the risk return paradigm)—is present only amongst the overpriced firms. In other words, not all high credit risk stocks and bonds underperform, only the overpriced ones do. Among overpriced firms, the credit risk effect is −57 bpm among stocks and −21 bpm among bonds. Note that among underpriced firms, high credit risk bonds actually earn returns that are higher than those of low credit risk bonds by 12 bpm in Panel B.1 and by 24 bpm in Panel C.1.

Panels A-C of Table 3 show that returns of underpriced stocks are very similar across credit risk groups. Further, when downgrade periods are removed, the most affected portfolios are those of the high credit risk overpriced stocks and bonds. For instance, in Panel A the returns of the high credit risk portfolio of bonds (stocks) increase from 59 bpm (72 bpm) to 83 bpm (146 bpm). Thus, it is the high credit risk, overpriced stocks and bonds that generate the trading profits from the short side of the trading strategy due to the large negative returns around financial distress. When downgrade periods are removed, the overpriced high credit risk stocks and bonds earn returns that are indistinguishable from low credit risk stocks and bonds (see sub-panels 2 and 4 in Panels A-C). The only exception is in Panel C.2 where amongst the most overpriced stocks, the bond returns of the C3 firms

and reporting the intercept along with its t-statistic.

are higher than those of the C1 firms by 16 bpm.

Figure 1 reinforces the evidence that mispricing in equity and bond markets exists due to overpricing amongst low rated firms during periods of distress. Panels A-C (D-F) display the returns of bonds (stocks) from 36 months before to 36 months after downgrades, where month 0 stands for the downgrade event. Panels A and D show that downgrades in C1 firms have very little impact on stock and bond returns (dashed line). In contrast, amongst the high credit risk C3 firms (solid line), both stocks and bonds experience negative returns for months prior to the downgrade and even more negative returns during the month of downgrade. The large negative return in the month of the downgrade suggests that downgrade events among distressed stocks convey meaningful information possibly because customers, vendors, and employees abandon the firm, and further the access to credit channels gets more limited.

Dividing the sample into underpriced and overpriced firms at the time of downgrade, Panels B and E of Figure 1 show that downgrade events do not impact the returns of either the bonds or stocks of underpriced, high credit risk firms. For these underpriced firms, the information involving the downgrade appears to be already incorporated into asset prices. The big impact of downgrades occurs in overpriced high credit risk bonds and stocks (Panels C and F) which experience significant price correction around downgrades. As Table 3 Panels A–C show, once this negative price correction around downgrades is excluded, both bonds and stocks do not display any sort of mispricing.

In sum, the bonds and stocks or the overpriced, low rated C3 firms earn low returns during periods of financial distress.

2.3. ***Sentiment-driven pricing errors***

SYY argue that high investor sentiment triggers overpricing, while ACJP argue that high credit risk stocks around downgrades drive the overpricing of the short leg, which as shown here holds true for bonds. We next try to reconcile these two findings.

We examine the interaction between sentiment and mispricing in bonds and stocks around financial distress. Panels D and E of Table 3 reports the evidence. Specifically, we repeat the

analysis in Panel A, looking at stock and bond returns sorted on rating and the overpricing measure, but here Panel D (E) averages portfolio returns over months following low (high) monthly sentiment, $\text{SENTm}^{\perp}_{t-1} < 0$ ($\text{SENTm}^{\perp}_{t-1} > 0$).

When sentiment is low (Panels D.1 and D.3), there is no mispricing in any credit risk group and subsequent difference in bond and stock returns across the high and low overpricing portfolios are indistinguishable from zero. In low sentiment states, investors appear to correctly price stocks and bonds. When downgrade periods are excluded (Panels D.2 and D.4), there is still no return differential between stocks and bonds with high and low mispricing measure. The evidence suggests that when sentiment is low, the impact of downgrades is already priced.

Consistent with the risk-return trade-off, following low sentiment, bond returns of the C3 portfolios significantly exceed those of the C1 portfolios across all mispricing groups. In fact, stock returns of the C3 portfolios also exceed those of the C1 portfolios, albeit significantly so (at the 10% level) only for the medium overpricing category.

In contrast, when sentiment is high, both bond and stock investors appear to make 'pricing errors' leading to overpricing of high credit risk stocks and bonds. Following high sentiment periods, the overpriced, high credit risk stocks and bonds realize low returns (Panels E.1 and E.3). The High–Low overpricing based return differential in C3 firms is −45 bpm for bonds and −113 bpm for stocks. The return differential across the C2 firms is also a significant −43 bpm for stocks.

Figure 2 further illustrates the impact of downgrades on stock and bond returns following high and low sentiment. There is a clear difference in the market reaction to downgrades in both stocks and bonds. When sentiment is low, the bond and stock price reaction is brief and mild. When sentiment is high, the negative market reaction is much more pronounced and sluggish. For both stocks and bonds, the negative returns persist from 12 months before the downgrade to almost 12 months after the downgrade.

In sum, the well documented credit risk puzzle[15]—namely, the lower returns of high credit

[15]See Dichev (1998), Campbell, Hilscher, and Szilagyi (2008), and Avramov, Chordia, Jostova, and Philipov (2009), among others.

risk stocks—appears to exist only following high sentiment states and only among overpriced stocks (Panel E.3). The credit risk puzzle disappears once downgrade periods are removed, even following high sentiment states (Panel E.4). In low sentiment states, equity investors appear to properly price the impact of distress (Panels D.3 and D.4) and bond investors earn higher returns from high credit risk than low credit risk bonds (Panels D.1 and D.2) in accord with the risk-return tradeoff.

We show here that bonds corresponding to overpriced high credit risk, C3 firms also appear to be overpriced (Panel E.1), and they too earn negative returns around downgrades (Panel E.2). This is important because it suggests that the overpricing of high credit risk stocks in financial distress is unlikely to be due to wealth transfer between bondholders and shareholders, as suggested by Garlappi, Shu, and Yan (2008). While their suggests that bonds are underpriced during high sentiment periods, we show evidence to the contrary.

What is the nature of pricing errors made by investors? Our results suggest that sentiment-driven investors make one particular type of pricing error in high sentiment states—they consistently underestimate the impact of financial distress on stock and bond returns. Specifically, when periods around downgrades are excluded, overpricing disappears. In other words, bond and stock investors are sluggish in reacting to financial distress following periods of high sentiment.[16]

The prolonged impact of financial distress on stock and bond returns following periods of high sentiment is a puzzle. In particular, why do investors consistently under-react to distress? And why do not arbitrageurs step in to take advantage when bonds and stocks are mispriced? We next test whether uncertainty and trading frictions inhibit arbitrage activity.

2.4. ***Sentiment-driven pricing errors and uncertainty***

We examine whether firm-level uncertainty and trading frictions cause investors to make pricing errors and whether this uncertainty tends to get higher in high sentiment periods

[16]Results based on the annual sentiment index are presented in the internet appendix and are similar to those based on the monthly sentiment index. Table 3 Panels D and E report the analysis based on raw returns. Results based on risk-adjusted or characteristic-adjusted returns are similar (unreported).

and around rating downgrades.

We find that pricing errors occur among firms with higher information uncertainty and trading frictions, as proxied by analyst dispersion and idiosyncratic volatility, and moreover pricing errors are larger for firms with higher Amihud (2002) illiquidity measure.[17]

In Table 4, we repeat the independent sorts of Table 3 within subsamples of firms, sorted each month on the above proxies. Panel A (B) includes only firms that are below (above) the median for the month based on dispersion in analyst EPS forecasts. Similarly, Panels C/D (E/F) focus on subsamples that are below/above the median based on the three-factor idiosyncratic volatility[18] and the Amihud (2002) illiquidity measure.

Observe from Table 4 that investors make pricing errors when either analyst dispersion or idiosyncratic volatility is high. While pricing errors are present for relatively liquid stocks they are considerably higher for the illiquid stocks.[19] Strikingly, pricing errors occur only around periods of rating downgrades. As downgrade periods are removed from the sample, pricing errors become statistically insignificant even when information uncertainty is high. Thus, information uncertainty is unlikely to drive the mispricing.

Figure 3 shows that while uncertainty increases dramatically around downgrades, it does so in both high and low sentiment states. Analyst dispersion, idiosyncratic volatility, and turnover, all increase significantly around periods of financial distress and peak around the month of the downgrade. For example, analyst forecast dispersion for high credit risk firms increases from 14% to 60% in the three years prior to downgrades. Such patterns hold only for high credit risk stocks—the uncertainty surrounding high quality stocks do not seem to be affected by downgrades. The uncertainty of high credit risk stocks peaks around downgrades and that of low credit risk stocks stays relatively stable. However, the increase in uncertainty in the high credit risk stocks around downgrades appears equally severe following high and

[17]Analyst EPS forecast dispersion is measured as the standard deviation of analysts' EPS forecasts for the next fiscal year, standardized by the absolute value of the consensus forecast, subject to at least two analysts covering the firm. Idiosyncratic volatility is estimated from regressing daily stock returns on the Carhart (1997) four factors. A stock's idiosyncratic volatility in month t is the sum of month t's daily squared residuals. Turnover is measured as the percentage of shares outstanding traded in a particular month.

[18]Results based on the four-factor idiosyncratic volatility are virtually the same.

[19]In the internet appendix, we provide results for yet another proxy, viz., turnover. Harris and Raviv (1993), D'Avolio (2002) and Amihud (2002) consider turnover to be a proxy for investor disagreement.

low sentiment. Thus, it is not investor sentiment but it is financial distress that impacts uncertainty in the low rated firms.

The results so far show that while investors appear to be making pricing errors about the impact of downgrades in high sentiment states (Table 3) and in high credit risk and high uncertainty stocks (Table 4), it is not the uncertainty per se that causes the mispricing (as it is the same in high and low sentiment periods). What seems to matter is the way investors price the rising uncertainty in high versus low sentiment states.

We next examine the frequency and impact of financial distress following high and low sentiment periods. It could be that downgrades are more severe in magnitude and frequency following high sentiment, leading to lower returns of distressed stocks in these states. Table 5 shows that this is not the case. Panel A reports the frequency of downgrades over the month following portfolio formation— across all credit risk groups overpriced stocks are more likely to be downgraded than underpriced stocks. For example, following low sentiment, an overpriced C3 firm has a 1.94% chance of being downgraded over the following month, versus 0.57% for an underpriced C3 firm. However, an overpriced C3 firm has about the same likelihood of being downgraded following low sentiment: 1.98%.

Similarly, high credit risk firms are not more likely to be downgraded in the 12 months following high versus low sentiment—an overpriced C3 firm has a 20.82% chance of being downgraded following low sentiment and 17.74% following high sentiment (Table 5 Panel B). Moreover, the size of the downgrade appears similar (1.41 versus 1.49 notches, Panel C).

In contrast, overpriced C3 stocks and bonds earn significantly lower returns during financial distress following high sentiment periods, while their impact following low sentiment is no different from that of other stocks. This is illustrated in Table 5, Panels D and E, where we compute the distress period bond and stock returns following low and high sentiment. Around financial distress, an overpriced C3 stock earns 95 bpm following low sentiment and -142 bpm following high sentiment. The return spread between high and low sentiment for overpriced C3 stocks is -237 bpm (t-statistic of -2.34, unreported). Moreover, following high sentiment the distress period return of overpriced C3 stocks is -171 bpm lower than the distress period return of underpriced C3 stocks and -194 bpm lower than overpriced C1

stocks, both significant (see Panel E.2.). The impact of downgrades on bond returns follows a similar pattern. Overpriced C3 bonds are also the only ones having negative distress period returns and again this only characterizes high sentiment periods. Panel D.2 shows that, following high sentiment, their distress period returns are significantly lower than underpriced C3 bonds (by −68 bpm) as well as overpriced C1 bonds (by −84 bpm). In contrast, Panel D.1 shows that, following low sentiment, distress period returns are similar among overpriced and underpriced bonds.

In sum, while uncertainty is high during periods of financial distress, it is the overpricing in low-rated firms during high sentiment periods that leads to the low bond and stock returns.

2.5. ***Evidence from Fama-MacBeth regressions***

Stock-level cross-sectional regressions confirm the results based on portfolio sorts. Specifically, Table 6 presents results from Fama-MacBeth cross-sectional regressions of month t risk-adjusted stock and bond returns on month $t-1$ dummy variables indicating underpricing, overpricing, financially distressed periods, and other lagged control variables. Underpricing (Overpricing) is a dummy variable taking on the value one if the stock belongs to the most underpriced (overpriced) decile of stocks during month $t-1$, and zero otherwise, where overpricing is measured based on the 12 anomalies noted earlier.

Using dummies for the extreme overpriced and underpriced portfolios, the slope coefficients are economically meaningful as they represent the average return of the extreme portfolios over the remaining portfolios. We can then identify whether mispricing comes from over- or underpricing. Overpricing is also interacted with a dummy variable, Distress, that represents financial distress. Distress takes the value one for 12 months before to 12 months after an issuer rating downgrade and zero otherwise. The interacted variable allows one to examine whether mispricing is attributable to a specific period for the firm, namely financial distress.

Stock returns in Panel A are risk adjusted as in Brennan, Chordia, and Subrahmanyam (1998) using the Fama and French (2015) five factors: MKT, SMB, HML, RMW, CMA. Bond

returns in Panel B are adjusted similarly using the Fama and French (1993) three equity and two bond factors: MKT, SMB, HML, TERM, and DEF. The table reports the time-series average of the cross-sectional coefficients (all multiplied by 100), with their associated t-statistics in parentheses. The sub-panels for low (high) sentiment average the cross-sectional regression coefficients only over months following low (high) monthly sentiment $\text{SENTm}^{\perp}_{t-1} < 0$ ($\text{SENTm}^{\perp}_{t-1} > 0$).

The coefficient of the underpricing dummy in Panel A indicates that the most underpriced decile of stocks does not significantly outperform any other deciles over the subsequent month—the return is insignificant and ranges between 2 and 13 bpm depending on the regression specification. Moreover, the underpricing dummy coefficient is insignificant following both high and low sentiment, indicating that investor sentiment has no effect on subsequent returns of underpriced stocks. In contrast, stocks in the most overpriced decile earn significantly lower returns than all other stocks, by 41 bpm. Again the overpricing return relation is negative only following high sentiment periods when the average return of the most overpriced stock decile amounts to −47 bpm.

Regression specification 4 in Panel A of Table 6 shows that low returns obtain during periods of distress. Regression specification 2 shows that overpriced stocks earn low returns during periods of distress. The shares of most overpriced firms in financial distress underperform those of other firms by 190 bpm, while overpriced stocks that are not in financial distress do not subsequently underperform.

Remarkably, the Overpricing×Distress dummy variable averages returns over only 4% of the sample observations, suggesting that the overpricing in stocks and bonds is driven by a small cross-section of stocks over a relatively small portion of the sample period. Following low sentiment, the interaction term 'Overpricing×Distress' is less than half that following high sentiment and is statistically insignificant at the 5% level. Indeed, Figure 2 shows that the impact of downgrades following low sentiment is relatively small, while the impact of downgrades following high sentiment is prolonged and more severe.

Controlling risk adjusted returns for prior month's Amihud illiquidity measure, turnover, rating, leverage, and past one month return does not affect the overall findings (compare

regression specification 3 and 5).[20]

The results based on risk-adjusted bond returns in Panel B of Table 6 lead to similar conclusions. As in the case with stocks, the negative returns obtain from overpricing in financially distressed periods following high sentiment. There is some evidence of underpricing; the regression specification 5 shows a 4 bpm return to underpriced stocks comparing to -20 bpm (-38 bpm) for overpriced stock in regression specification 1 over all months (months following high sentiment periods). All the negative returns to overpriced bonds emanates from distress periods following high sentiment, when these bonds underperform by 95 bpm. In regression specification 5 following high sentiment months, the evidence indicates that the negative returns to overpriced bonds obtains during periods of financial distress.

Note from Panel B that past bond returns have a significant impact on current bond returns even after controlling for overpricing and downgrades. This evidence on bond momentum is consistent with Jostova, Nikolova, Philipov, and Stahel (2013) who find that even when past equity returns predict bond returns, still, there is an independent bond momentum component attributable to high credit risk winners around downgrades. What is new here is that bond momentum tends to be stronger following high sentiment.

Overall, the results suggest that while stocks and bonds of distressed firms earn low returns, realized returns are even lower for firms with overpriced equity, especially after periods of high investor sentiment.

2.6. ***Robustness to alternative credit risk measures***

Throughout the paper, we use a firm's S&P long-term issuer credit rating as our credit risk measure. We do so because credit ratings are publicly available, downgrades are readily identifiable, time-stamped, and available to investors. Alternative measures of credit risk are model-specific, and 'downgrade events' are not as readily and uniquely identifiable.

Nevertheless, we examine the robustness of our results to alternative measures of credit risk: Altman's (1968) Z-score and Failure Probability (FP, calculated as in Campbell,

[20]We do not control for past returns over longer horizons as momentum is one of the anomalies included in the overpricing measure.

Hilscher, and Szilagyi 2008). Specifically, Table IA.I Panel A (B) in the internet appendix, repeats the analysis in Table 3 Panel A, but uses Z-score (FP) instead of credit rating when double sorting on credit risk and the overpricing measure. Note that Z-scores decrease in credit risk (i.e., Z1 is the highest credit risk tercile), while Failure Probability increases in credit risk (i.e., FP3 is the highest credit risk tercile).

Panels A and B of Table IA.I (in the internet appendix) confirm our findings that overpricing exists in both stocks and bonds amongst only the high credit risk firms and only around financial distress. Here, financial distress is identified as the firm-month observations in the lowest (highest) Z-score (FP) decile for the entire sample. Removing these extreme credit risk observations eliminates all mispricing from both stocks and bonds. Panels D and F confirm that mispricing exists only in high sentiment states. There is no mispricing in sentiment is low (Panels C and E).

3. Discussion: Reassessing potential explanations

Our findings help reassess the various explanations offered for anomaly-based mispricing in the cross-section of stock returns.

Risk-based story. One immediate reaction is that anomaly payoffs could represent compensation for some type of non-diversifiable risk. The risk and characteristic adjustments in Panels B and C of Table 3 partially alleviate such concerns. Moreover, if the risk of distressed high credit risk stocks were non-diversifiable, then their lower returns would imply a *negative* risk premium for holding riskier stocks. This would be justifiable only if these stocks were offering some type of a hedge against consumption risk, i.e., if they tend to offer high returns during recessions or when market returns are low. Yet, there is little evidence for that.

Table 1 shows that high credit risk stocks in fact exhibit higher betas and moreover ACJP find that downgrades are not less likely in recession and their impact is not less severe. Moreover, ACJP document that downgrade events tend to be idiosyncratic in nature

— they do not tend to occur in clusters. Finally, Table 7 shows that high credit risk stocks, especially those in financial distress, seem to offer the least diversification benefits relative to bonds, as their return correlations with bonds are the highest. Overall, these findings suggest that high credit risk distressed stocks offer little benefits in terms of reducing the overall systematic risk to justify their low returns.

Wealth transfer and shareholder recovery. One explanation for overvalued high credit risk stocks is that around financial distress, there are often violations of the absolute priority rule, and stockholders are able to extract value from bondholders (see Garlappi, Shu, and Yan 2008 and Garlappi and Yan 2011). Our results show that around financial distress, the bonds of high credit risk distressed firms earn lower returns just like their equity counterparts. This suggests that if shareholders are extracting value during reorganizations, they are most likely extracting it from other stakeholders, rather than holders of public bonds, as bonds are also overpriced.

Moreover, Table 7 shows that the cross-sectional correlations between bond and stock returns of the same firm are the highest (around 24%) among the most overpriced high credit risk firms (see Panels A.1 and B.1). These correlations are even higher around financial distress, where the absolute priority rule is most likely to be violated, since the numbers excluding downgrades (in Panels A.2 and B.2) are lower. Moreover, these bond-stock correlations appear to be equally high following low and high sentiment (compare Panels A.1 and B.1)[21].

Given that the correlations between stock and bond returns are higher for the low rated firms (possibly because, for these firms the high credit risk bonds start to behave more like equities) and that these correlations are even higher for the overpriced firms suggests that stocks are not overpriced due to wealth transfer from bondholders to shareholders during the re-organization negotiations.

[21]Results based on the annual sentiment index are provided in the Internet Appendix Table IA.II

Trading frictions. Trading frictions is another often discussed explanation for the *persistence* of anomaly profits. Indeed, Avramov, Chordia, Jostova, and Philipov (2009) find that high credit risk stocks tend to be more illiquid and harder to short sell, especially around downgrades. In the same vein, Table 4 Panels G and H show that mispricing is more pronounced in stocks and bonds of firms with high Amihud's (2002) stock illiquidity. However, notice first that mipspricing prevails among both liquid and illiquid stocks. Moreover, Jostova, Nikolova, Philipov, and Stahel (2013) use transaction data from TRACE and find that high credit risk corporate bonds tend to have higher turnover and lower effective transaction costs than their low risk counterparts.[22]

They find that bonds in the worst-rated quintile are four times more likely to trade than bonds in the best-rated quintile and their average trade size is twice as large. Moreover, aggregate data shows that NIG bonds represent 20% of corporate bonds and 40% of corporate bond trading volume.[23] Collectively, trading frictions do not seem to justify the persistence of mispricing in high credit risk bonds.

Perhaps most convincingly, trading frictions, which are related to firm characteristics such as illiquidity, turnover, idiosyncratic volatility, and information uncertainty, do indeed increase around downgrades. However, such measures increase during periods of financial distress for both high and low sentiment states (see Figure 3 Plot D). Recall in particular that pricing errors occur only during high sentiment. Thus, whereas trading frictions may explain the *persistence* of anomaly profits, they cannot fully explain why anomalies arise in the first place and why only in high sentiment states.

Institutional trading Institutional trading matters for two reasons. On one hand, if institutions sell overpriced stocks to avoid their lower returns, this could indicate that they are trying to arbitrage away the mispricing. Second, institutional trading itself could be creating selling pressure and thus causing the negative returns. Figure 4 reports institutional

[22]While Edwards, Harris, and Piwowar (2007) find that transaction costs decrease with trade size, and for a fixed trade size, costs increase with credit risk, Jostova, Nikolova, Philipov, and Stahel (2013) show that high credit risk bonds have higher turnover and larger trade sizes, which result in lower effective transaction costs despite the adverse impact of higher credit risk.

[23]Source: FINRA TRACE FactBook 2010, Tables C24-C25

ownership, measured as the number of shares held by institutional investors as a percentage of total shares outstanding separately for downgrades following low and high sentiment and separately for high and low credit risk stocks.

The figure shows that downgrades do not seem to have any impact on institutional ownership of low credit risk stocks either in high or low sentiment. The picture is quite different for high credit risk stocks when sentiment is high—institutions are heavily unloading their holdings of soon-to-be-downgraded high credit risk stocks, reducing their holdings from about 64% to about 54% within the 30 months prior to the downgrade. They then increase their holdings again to the pre-financial distress levels over three years following the downgrade.

This suggests that at least some institutional investors are able to avoid the negative returns of overpriced stocks, which in turn indicates that there may be some arbitrage activity in these distressed stocks. Institutional investors's stockholdings decrease much more modestly prior to downgrades during low investor sentiment periods. The modest change in institutional ownership in low sentiment states may indicate less arbitrage activity in that state and potentially suggest that arbitrageurs are aware that mispricing is not as prevalent in low sentiment states.

The flip side of the decrease in institutional holdings prior to downgrades following high investor sentiment is that retail investors' ownership increases. When sentiment is high, retail investors appear to be willing to buy the shares of high uncertainty, high volatility, distressed firms despite their poor returns. The puzzle is why do retail investors buy shares of these firms, especially the low rated firms? Possibly retail investors are attracted by the "lottery-type" payoffs in distressed firms that survive. We discuss this in detail below.

With bonds, markets are almost exclusively dominated by institutional investors, so if sentiment and the awareness of mispricing exists, it is likely to affect one particular type of institutional investor more than another. For example, Grinblatt, Jostova, Petrasek, and Philipov (2016) argue that hedge funds are more likely to be contrarian (and successfully trade against the momentum anomaly through superior stock-picking skills) while mutual funds tend to be trend followers, potentially to cater to retail investors.

"Lottery type" payoffs. Coelho, John, Kumar, and Taffler (2014) provide another potential justification for paying higher than fundamental prices for overpriced high credit risk stocks (which appear to drive all mispricing). They argue that even stocks in Chapter 11 may be seen as potentially offering "lottery type" payoffs. In other words, investors may be willing to accept their normally lower returns in the hope of rare but extreme positive returns if the firm survives bankruptcy or if it is being acquired at a premium. This might be an explanation for why retail investors buy shares of low rated distressed firms with high uncertainty and high volatility. However, this potentially large upside potential is a feature of stocks, while bonds are fixed-income instruments and have a bounded upside, and yet we observe the same type of overpricing in the bonds of these "lottery type" firms.

The behavioral story. Our results lend the strongest support to behavioral explanations related to sentiment-driven overpricing. When firm valuations converge to fundamentals, the resulting negative returns drive the under-performance of the short side of anomalies in both stocks and bonds. The fact that investors do not make these pricing errors in low sentiment states faced with the same uncertainty and the same likelihood of distress, suggests that high sentiment seems to be engendering the extreme optimism with respect to financial distress. One conclusion based on bond and stock analyses is that sentiment seems to affect both retail and institutional investors. SYY find that sentiment-driven investors cause mispricing in equity markets. We find the same sentiment-driven mispricing in bond markets which are dominated by institutional investors. Moreover, while SYY focus on overvaluation during high sentiment periods, we show that such overpricing characterizes only the low-rated firms during financial distress.

4. Conclusion

This paper points to the source of mispricing in stocks and bonds. We identify the specific pricing errors that sentiment-driven investors make—they consistently underestimate the impact of financial distress on overpriced bonds and stocks of low rated firms. These specific pricing errors emerge only in high sentiment states, even when the likelihood and scale of

downgrades are equal across low and high sentiment states and even when trading frictions and information uncertainty all rise during downgrades but equally so for high and low sentiment states. The overall evidence points to behavioral based overpricing.

Institutional investors also seem to be affected by waves of sentiment. Indeed, sentiment-driven mispricing occurs in the bond markets as well and bond markets are dominated by large institutions. In high sentiment states, investors seem to be too optimistic and tend to price assets as if high credit risk stocks are immune to financial distress. Yet there is no mispricing in low sentiment states suggesting that investors are not always affected by behavioral biases. In low sentiment states, they appear to have a realistic view of financial distress and rationally price stocks and bonds.

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Table 1
Descriptive Statistics

The table provides descriptive statistics for our sample sorted on prior month S&P issuer credit rating. We report the time-series average of the cross-sectional mean characteristic. The numerical ratings increase with credit risk: i.e. 1=AAA, 2=$AA+$, ..., 21=C, 22=D. Ratings 11=$BB+$ or higher (worse) are non-investment grade [NIG]. Ratings 10=$BBB-$ or lower (better) are investment-grade [IG]. The SYY overpricing measure ranges between 1 to 10 (10=most overpriced). The reported alphas are portfolio based—we sort firms into quintile based on prior month rating, then regress the equally weighted quintile portfolio returns on the factors and report the time-series regression coefficients. The remaining variables are described in Section 1.

	S&P issuer credit rating quintile (C1=best rated, C5=worst rated)				
Characteristic	C1	C2	C3	C4	C5
Equity or Firm-level Data					
Issuer letter rating	A+	A−	BBB	BB+	B+
Issuer numeric rating	4.62	7.21	9.01	11.33	14.35
Fraction of NIG firms ($\leq BB+$)	0.00	0.00	0.15	0.63	0.96
Failure Probability (%)	0.12	0.08	0.12	0.32	2.04
Z-score	0.97	0.81	0.74	0.54	0.18
Market capitalization ($bln)	24.23	7.48	4.16	2.46	1.35
Book-to-market ratio	0.64	0.87	0.86	0.95	1.19
Idiosyncratic volatility (% per month)	1.20	1.32	1.49	1.87	2.82
Amihud illiquidity (×100)	0.53	0.53	1.04	9.70	57.48
Institutional ownership (% of shares outst.)	56.15	58.96	60.98	60.82	49.52
Coverage (# of analysts)	18.89	15.14	13.07	11.00	7.17
Dispersion in analyst forecasts	0.05	0.09	0.14	0.27	0.54
SUE	1.06	0.53	0.48	0.27	0.05
Fraction SUE$\leq$ 0	0.29	0.35	0.36	0.40	0.45
SYY overpricing measure	4.85	5.27	5.47	5.78	6.15
Fraction overpriced (SYY$\geq$ 5.5)	0.27	0.43	0.50	0.62	0.74
Stock return (% per month)	1.03	1.14	1.18	1.19	0.55
CAPM alpha (% per month)	0.21	0.30	0.30	0.23	−0.61
4-factor alpha (% per month)	0.10	0.16	0.15	0.10	−0.58
MKT beta	0.95	0.98	1.04	1.13	1.40
SMB beta	−0.16	0.04	0.16	0.51	0.73
HML beta	0.40	0.52	0.60	0.75	0.60
UMD beta	−0.05	−0.07	−0.11	−0.23	−0.40
Bond Data					
Average bond rating	4.86	7.26	9.16	11.99	15.16
Number of bond issues per firm	12.21	6.89	5.68	3.85	2.67
Amount outstanding ($millions/issue)	250.59	191.43	183.64	192.47	200.96
Age (years)	5.71	5.26	5.26	4.63	4.04
Time to maturity (years)	11.38	11.23	10.66	9.05	7.63
Duration (years)	6.52	6.48	6.22	5.63	4.72
STD of monthly returns (%)	1.93	2.12	2.38	2.78	4.15
Bond return (% per month)	0.66	0.70	0.71	0.76	0.52
CAPM alpha (% per month)	0.29	0.33	0.33	0.35	0.08
5-factor alpha (% per month)	0.07	0.09	0.10	0.17	−0.08
MKT beta	0.00	0.01	0.02	0.05	0.11
SMB beta	0.01	0.01	0.02	0.04	0.07
HML beta	0.02	0.03	0.05	0.07	0.10
TERM beta	0.78	0.79	0.74	0.55	0.41
DEF beta	0.48	0.53	0.63	0.73	0.75

Table 2
Bonds and Stocks Returns Sorted on Overpricing

Each month t, we sort firms into decile portfolios, P1 to P10, based on the SYY overpricing measure (see Section 1.5), and compute equally weighted month $t+1$ portfolio returns of stocks and bonds. The table reports the time-series average of these portfolio returns, along with their sample t-statistics (in parentheses, bold if significant at the 5% level). It does so for the overall sample, as well as for the investment-grade [IG] and non-investment grade [NIG] subsamples (keeping the SYY portfolio cutoffs fixed across subsamples). The sample includes all firms that have stock returns, bond returns, and S&P issuer rating, and are priced above \$1 at the prior month end.

	Firm-Level Bonds			Stocks		
	All	IG	NIG	All	IG	NIG
P1	0.72	0.70	0.91	1.20	1.12	1.84
	(**9.97**)	(**9.17**)	(**9.63**)	(**4.60**)	(**4.51**)	(**3.73**)
P2	0.69	0.65	0.96	1.18	1.10	1.68
	(**9.46**)	(**8.21**)	(**10.47**)	(**4.44**)	(**4.31**)	(**2.55**)
P3	0.75	0.71	0.88	1.24	1.24	1.46
	(**10.40**)	(**9.07**)	(**7.70**)	(**4.50**)	(**4.81**)	(**2.99**)
P4	0.73	0.69	0.86	1.27	1.17	1.54
	(**9.42**)	(**8.46**)	(**6.40**)	(**4.34**)	(**4.29**)	(**3.26**)
P5	0.74	0.71	0.87	1.17	1.06	1.35
	(**9.69**)	(**8.53**)	(**8.15**)	(**3.95**)	(**3.98**)	(**2.69**)
P6	0.73	0.69	0.90	1.16	1.12	1.23
	(**9.13**)	(**8.37**)	(**6.69**)	(**3.68**)	(**4.14**)	(**2.29**)
P7	0.72	0.71	0.78	1.01	1.01	1.34
	(**9.12**)	(**8.55**)	(**6.84**)	(**3.15**)	(**3.78**)	(**2.63**)
P8	0.70	0.68	0.77	1.04	1.01	1.22
	(**8.99**)	(**8.24**)	(**6.86**)	(**3.14**)	(**3.81**)	(**2.34**)
P9	0.71	0.69	0.83	0.98	1.00	0.75
	(**8.77**)	(**8.07**)	(**7.76**)	(**2.80**)	(**3.52**)	(1.49)
P10	0.41	0.63	0.35	0.35	0.81	0.08
	(**3.58**)	(**7.10**)	(**2.01**)	(0.81)	(**2.63**)	(0.13)
P10–P1	−0.31	−0.08	−0.56	−0.84	−0.30	−1.77
	(−**3.09**)	(−1.79)	(−**3.51**)	(−**2.63**)	(−1.34)	(−**3.61**)

Table 3
Bond and Stock Returns
Sorted on Credit Risk and Overpricing

Each month t, firms are sorted independently on month-t issuer credit rating and SYY overpricing. The table reports the time-series mean of the equally weighted cross-sectional average month $t+1$ portfolio return. Each Panel has 4 subpanels—subpanels 1 and 2 report average month $t+1$ firm-level bond returns, while subpanels 3 and 4 report average month $t+1$ stock returns. Subpanels 1 and 3 include all available returns, while subpanels 2 and 4 exclude observations from 12 months before to 12 months after an issuer credit rating downgrade. Panel A reports raw portfolio returns. Panel B reports returns risk-adjusted for the Fama and French (1993) stock and bond 5-factors (TERM, DEF, MKT, SMB, HML) for bonds and the Fama and French (2015) factors (MKT, SMB, HML, RMW, CMA) for stocks. Panel C reports characteristic-adjusted stock and bond returns. Stock returns are characteristic-adjusted by size and book-to-market ratio. Bond returns are characteristic-adjusted by amount outstanding and duration. The characteristic-adjusted return of a stock (bond) is its month-t return minus the value-weighted average return of stocks (bonds) belonging to the same characteristic group, determined by a 3×3 independent sort on two characteristics. Panel D (E) averages portfolio returns only over months following low (high) monthly sentiment $\text{SENTm}^{\perp}_{t-1} < 0$ ($\text{SENTm}^{\perp}_{t-1} > 0$). The bottom part of Panel A shows the average number of firms per portfolio per month.

Sort on	Sort on Overpricing							
Credit Risk	Low	Medium	High	High−Low	Low	Medium	High	High−Low
Panel A: Raw returns								
A.1. Bond returns					*A.2. Excluding downgrades*			
C1	0.66	0.68	0.69	0.03	0.67	0.70	0.71	0.04
	(**8.28**)	(**8.16**)	(**8.03**)	(1.38)	(**8.35**)	(**8.25**)	(**8.10**)	(1.56)
C2	0.73	0.72	0.68	−0.05	0.75	0.75	0.73	−0.02
	(**9.37**)	(**8.56**)	(**8.11**)	(−1.51)	(**9.75**)	(**8.76**)	(**8.58**)	(−0.79)
C3	0.84	0.77	0.59	−0.25	0.87	0.84	0.83	−0.04
	(**12.33**)	(**9.80**)	(**6.15**)	(−**4.22**)	(**13.02**)	(**11.31**)	(**9.59**)	(−0.95)
C3–C1	0.18	0.08	−0.10	−0.28	0.20	0.14	0.12	−0.08
	(**2.70**)	(1.09)	(−1.00)	(−**4.39**)	(**3.11**)	(**2.04**)	(1.41)	(−1.59)
A.3. Stock returns					*A.4. Excluding downgrades*			
C1	1.08	1.06	1.12	0.04	1.19	1.23	1.33	0.14
	(**4.76**)	(**4.21**)	(**4.25**)	(0.21)	(**5.30**)	(**5.01**)	(**5.07**)	(0.74)
C2	1.21	1.14	0.89	−0.32	1.30	1.23	1.22	−0.08
	(**4.41**)	(**4.06**)	(**3.13**)	(−**2.18**)	(**4.79**)	(**4.55**)	(**4.47**)	(−0.51)
C3	1.43	1.33	0.72	−0.71	1.52	1.62	1.46	−0.05
	(**4.06**)	(**3.50**)	(1.72)	(−**3.07**)	(**4.37**)	(**4.69**)	(**3.92**)	(−0.26)
C3–C1	0.35	0.28	−0.39	−0.74	0.33	0.39	0.14	−0.19
	(1.54)	(1.21)	(−1.48)	(−**3.02**)	(1.42)	(1.78)	(0.54)	(−0.77)
Number of firms per portfolio per month								
C1	59.8	36.0	19.6		49.5	26.9	14.0	
C2	46.0	51.2	42.7		36.5	38.5	30.6	
C3	29.1	52.8	82.2		22.6	37.9	53.7	

Table 3 (continued)

Sort on	Sort on Overpricing							
Credit Risk	Low	Medium	High	High−Low	Low	Medium	High	High−Low
Panel B: Risk-adjusted returns								
B.1. Bond returns					*B.2. Excluding downgrades*			
C1	0.32	0.34	0.35	0.03	0.33	0.36	0.37	0.04
	(**4.28**)	(**4.41**)	(**4.35**)	(1.33)	(**4.40**)	(**4.58**)	(**4.52**)	(1.58)
C2	0.36	0.35	0.30	−0.06	0.39	0.38	0.37	−0.02
	(**5.09**)	(**4.58**)	(**4.03**)	(−1.95)	(**5.53**)	(**4.87**)	(**4.77**)	(−0.91)
C3	0.43	0.32	0.13	−0.30	0.47	0.42	0.39	−0.08
	(**7.57**)	(**5.24**)	(1.84)	(−**5.75**)	(**8.15**)	(**6.84**)	(**5.77**)	(−1.04)
C3–C1	0.12	−0.02	−0.21	−0.33	0.14	0.06	0.02	−0.12
	(**1.96**)	(−0.28)	(−**2.60**)	(−**5.67**)	(**2.44**)	(1.03)	(0.34)	(−1.54)
B.3. Stock returns					*B.4. Excluding downgrades*			
C1	0.09	0.00	0.10	0.00	0.23	0.22	0.29	0.07
	(1.10)	(0.04)	(0.67)	(0.03)	(**2.57**)	(1.74)	(1.78)	(0.37)
C2	0.02	−0.00	−0.23	−0.25	0.14	0.12	0.11	−0.03
	(0.17)	(−0.02)	(−1.70)	(−1.73)	(1.40)	(0.97)	(0.72)	(−0.19)
C3	−0.03	−0.14	−0.47	−0.44	0.08	0.21	0.28	0.20
	(−0.19)	(−0.89)	(−**2.38**)	(−**2.24**)	(0.46)	(1.38)	(1.52)	(1.10)
C3–C1	−0.12	−0.14	−0.57	−0.45	−0.15	−0.01	−0.01	0.14
	(−0.76)	(−0.86)	(−**2.88**)	(−**2.03**)	(−0.82)	(−0.04)	(−0.06)	(0.60)
Panel C: Characteristic-adjusted returns								
C.1. Bond returns					*C.2. Excluding downgrades*			
C1	−0.02	0.00	0.01	0.03	−0.03	0.01	0.01	0.04
	(−1.09)	(0.23)	(0.39)	(1.08)	(−**2.16**)	(0.49)	(0.32)	(1.22)
C2	0.05	0.04	−0.01	−0.06	0.06	0.05	0.04	−0.02
	(**2.57**)	(**1.96**)	(−0.29)	(−**1.99**)	(**2.62**)	(**2.58**)	(1.56)	(−0.79)
C3	0.23	0.13	−0.06	−0.29	0.22	0.14	0.17	−0.05
	(**4.35**)	(**2.19**)	(−0.73)	(−**4.59**)	(**4.23**)	(**2.45**)	(**2.75**)	(−1.20)
C3–C1	0.24	0.12	−0.07	−0.31	0.25	0.13	0.16	−0.09
	(**4.09**)	(1.84)	(−0.73)	(−**4.55**)	(**4.23**)	(**2.00**)	(**2.07**)	(−1.63)
C.3. Stock returns					*C.4. Excluding downgrades*			
C1	0.18	0.09	0.15	−0.03	0.12	0.03	0.11	−0.02
	(1.87)	(0.79)	(1.08)	(−0.18)	(1.28)	(0.23)	(0.69)	(−0.09)
C2	0.13	0.09	−0.17	−0.30	0.01	−0.05	−0.10	−0.11
	(1.69)	(1.01)	(−1.57)	(−**2.20**)	(0.13)	(−0.50)	(−0.82)	(−0.74)
C3	0.20	0.14	−0.38	−0.58	0.03	0.09	−0.05	−0.08
	(1.42)	(1.14)	(−**2.44**)	(−**2.70**)	(0.21)	(0.76)	(−0.32)	(−0.39)
C3–C1	0.02	0.05	−0.53	−0.55	−0.09	0.06	−0.15	−0.06
	(0.14)	(0.31)	(−**2.59**)	(−**2.35**)	(−0.51)	(0.36)	(−0.74)	(−0.26)

Table 3 (continued)

Sort on	Sort on Overpricing							
Credit Risk	Low	Medium	High	High−Low	Low	Medium	High	High−Low
Panel D: Raw Returns: LOW SENTIMENT (Monthly $SENTm^{\perp}_{t-1} < 0$)								
D.1. Bond returns					*D.2. Excluding downgrades*			
C1	0.64	0.69	0.70	0.06	0.65	0.71	0.71	0.06
	(**6.04**)	(**6.34**)	(**5.93**)	(1.09)	(**6.07**)	(**6.48**)	(**5.92**)	(1.04)
C2	0.79	0.81	0.78	−0.01	0.82	0.83	0.81	−0.01
	(**7.32**)	(**7.12**)	(**6.63**)	(−0.32)	(**7.61**)	(**7.36**)	(**7.01**)	(−0.32)
C3	1.02	1.01	0.98	−0.04	1.02	1.03	1.02	−0.00
	(**11.45**)	(**10.23**)	(**8.47**)	(−0.62)	(**11.78**)	(**11.07**)	(**9.27**)	(−0.03)
C3–C1	0.37	0.32	0.28	−0.10	0.38	0.32	0.31	−0.06
	(**3.94**)	(**3.35**)	(**2.33**)	(−1.45)	(**4.05**)	(**3.39**)	(**2.60**)	(−1.04)
D.3. Stock returns					*D.4. Excluding downgrades*			
C1	1.30	1.20	1.27	−0.02	1.34	1.35	1.49	0.15
	(**4.53**)	(**3.85**)	(**3.57**)	(−0.10)	(**4.73**)	(**4.34**)	(**4.22**)	(0.62)
C2	1.42	1.32	1.22	−0.20	1.49	1.48	1.41	−0.08
	(**3.95**)	(**3.52**)	(**3.24**)	(−1.06)	(**4.30**)	(**4.25**)	(**4.10**)	(−0.47)
C3	1.79	1.76	1.51	−0.28	1.79	1.85	1.85	0.06
	(**3.66**)	(**3.31**)	(**2.61**)	(−0.90)	(**3.80**)	(**3.88**)	(**3.66**)	(0.23)
C3–C1	0.49	0.56	0.24	−0.25	0.45	0.50	0.37	−0.08
	(1.43)	(1.69)	(0.68)	(−0.79)	(1.32)	(1.65)	(1.28)	(−0.26)
Panel E: Raw Returns: HIGH SENTIMENT (Monthly $SENTm^{\perp}_{t-1} > 0$)								
E.1. Bond returns					*E.2. Excluding downgrades*			
C1	0.68	0.68	0.68	0.01	0.70	0.69	0.71	0.02
	(**5.70**)	(**5.31**)	(**5.43**)	(0.16)	(**5.77**)	(**5.32**)	(**5.54**)	(0.42)
C2	0.66	0.64	0.58	−0.08	0.69	0.68	0.66	−0.03
	(**5.95**)	(**5.11**)	(**4.88**)	(−1.62)	(**6.21**)	(**5.23**)	(**5.23**)	(−0.75)
C3	0.67	0.52	0.22	−0.45	0.72	0.66	0.64	−0.08
	(**6.58**)	(**4.44**)	(1.46)	(**−4.69**)	(**7.18**)	(**5.76**)	(**4.87**)	(−1.19)
C3–C1	−0.01	−0.15	−0.47	−0.46	0.02	−0.03	−0.07	−0.10
	(−0.10)	(−1.38)	(**−3.15**)	(**−4.31**)	(0.27)	(−0.30)	(−0.64)	(−1.20)
E.3. Stock returns					*E.4. Excluding downgrades*			
C1	0.87	0.92	0.96	0.09	1.05	1.12	1.17	0.13
	(**2.47**)	(**2.34**)	(**2.49**)	(0.36)	(**3.00**)	(**2.94**)	(**3.02**)	(0.45)
C2	1.00	0.97	0.57	−0.43	1.11	0.99	1.03	−0.07
	(**2.42**)	(**2.30**)	(1.34)	(**−1.96**)	(**2.66**)	(**2.39**)	(**2.44**)	(−0.29)
C3	1.08	0.91	−0.05	−1.13	1.25	1.39	1.08	−0.17
	(**2.13**)	(1.68)	(−0.08)	(**−3.32**)	(**2.45**)	(**2.78**)	(**1.97**)	(−0.57)
C3–C1	0.21	−0.00	−1.01	−1.22	0.21	0.27	−0.09	−0.30
	(0.72)	(−0.02)	(**−2.54**)	(**−3.33**)	(0.66)	(0.88)	(−0.22)	(−0.79)

Table 4
Bond and Stock Returns
Sorted on Credit Risk and Overpricing
in Subsamples based on Uncertainty and Illiquidity

We repeat the independent sorts in Table 3 Panel A within subsamples of firms, sorted on some characteristic each month. Panel A (B) includes only firms that are below (above) the median based on dispersion in analyst EPS forecasts for the month. Similarly, Panels C/D (E/F) focus on subsamples that are below/above the median based on three-factor idiosyncratic volatility (Amihud's (2002) illiquidity). The table reports raw equally weighted portfolio returns.

Sort on	Sort on Overpricing							
Credit Risk	Low	Medium	High	High−Low	Low	Medium	High	High−Low
Panel A: Low dispersion half								
A.1. Bond returns					*A.2. Excluding downgrades*			
C1	0.65	0.67	0.67	0.02	0.66	0.67	0.67	0.01
	(**8.12**)	(**8.10**)	(**7.69**)	(0.73)	(**8.31**)	(**8.00**)	(**7.57**)	(0.18)
C2	0.71	0.71	0.68	−0.04	0.72	0.72	0.71	−0.01
	(**8.61**)	(**8.37**)	(**7.89**)	(−1.28)	(**8.78**)	(**8.45**)	(**8.23**)	(−0.48)
C3	0.77	0.76	0.74	−0.02	0.80	0.80	0.82	0.01
	(**10.92**)	(**9.95**)	(**9.12**)	(−0.53)	(**11.66**)	(**10.22**)	(**9.93**)	(0.25)
C3–C1	0.12	0.09	0.08	−0.04	0.14	0.14	0.15	0.01
	(**2.33**)	(1.78)	(1.23)	(−0.81)	(**2.60**)	(**2.78**)	(**2.44**)	(0.11)
A.3. Stock returns					*A.4. Excluding downgrades*			
C1	1.02	1.10	0.91	−0.12	1.12	1.30	1.04	−0.09
	(**4.35**)	(**4.61**)	(**3.96**)	(−0.71)	(**4.80**)	(**5.35**)	(**4.36**)	(−0.48)
C2	1.15	1.12	0.93	−0.22	1.19	1.24	1.16	−0.03
	(**4.34**)	(**4.22**)	(**3.58**)	(−1.39)	(**4.52**)	(**4.63**)	(**4.48**)	(−0.19)
C3	1.23	1.31	0.91	−0.32	1.33	1.33	1.21	−0.11
	(**3.92**)	(**4.47**)	(**2.94**)	(−1.68)	(**4.13**)	(**4.56**)	(**4.16**)	(−0.56)
C3–C1	0.21	0.21	0.01	−0.20	0.20	0.02	0.17	−0.04
	(1.01)	(1.17)	(0.04)	(−0.86)	(0.92)	(0.10)	(0.78)	(−0.14)
Panel B: High dispersion half								
B.1. Bond returns					*B.2. Excluding downgrades*			
C1	0.68	0.69	0.70	0.02	0.70	0.73	0.73	0.02
	(**8.32**)	(**8.32**)	(**7.45**)	(0.39)	(**8.45**)	(**8.73**)	(**7.51**)	(0.50)
C2	0.75	0.70	0.71	−0.04	0.80	0.76	0.79	−0.01
	(**9.65**)	(**7.90**)	(**8.07**)	(−0.95)	(**10.52**)	(**8.52**)	(**9.06**)	(−0.33)
C3	0.83	0.74	0.45	−0.38	0.82	0.88	0.80	−0.01
	(**9.78**)	(**7.64**)	(**3.74**)	(**−4.03**)	(**7.71**)	(**9.60**)	(**7.35**)	(−0.13)
C3–C1	0.15	0.05	−0.24	−0.40	0.11	0.16	0.08	−0.03
	(1.79)	(0.53)	(**−1.97**)	(**−4.00**)	(1.02)	(1.67)	(0.73)	(−0.24)
B.3. Stock returns					*B.4. Excluding downgrades*			
C1	1.23	1.07	0.97	−0.27	1.37	1.16	1.39	0.01
	(**4.22**)	(**3.62**)	(**3.20**)	(−1.33)	(**4.83**)	(**3.89**)	(**4.44**)	(0.05)
C2	1.38	1.29	1.20	−0.18	1.70	1.54	1.63	−0.07
	(**3.99**)	(**3.50**)	(**3.09**)	(−0.78)	(**4.96**)	(**4.46**)	(**4.39**)	(−0.26)
C3	1.63	1.04	0.45	−1.18	1.75	1.44	1.44	−0.30
	(**3.58**)	(**2.19**)	(0.93)	(**−3.57**)	(**3.83**)	(**3.18**)	(**3.24**)	(−0.91)
C3–C1	0.39	−0.05	−0.52	−0.91	0.38	0.27	0.07	−0.32
	(1.46)	(−0.15)	(−1.60)	(**−2.57**)	(1.27)	(0.85)	(0.22)	(−0.83)

Table 4 (continued)

Sort on	Sort on Overpricing							
Credit Risk	Low	Medium	High	High−Low	Low	Medium	High	High−Low
Panel C: Low idiosyncratic volatility half								
	C.1. Bond returns				*C.2. Excluding downgrades*			
C1	0.66	0.67	0.67	0.01	0.67	0.68	0.68	0.01
	(**8.26**)	(**8.27**)	(**7.69**)	(0.57)	(**8.33**)	(**8.33**)	(**7.55**)	(0.39)
C2	0.70	0.70	0.69	−0.01	0.72	0.72	0.72	−0.00
	(**8.75**)	(**7.94**)	(**7.74**)	(−0.50)	(**9.01**)	(**7.99**)	(**8.12**)	(−0.05)
C3	0.77	0.74	0.71	−0.06	0.82	0.76	0.74	−0.08
	(**10.64**)	(**9.74**)	(**8.87**)	(−1.46)	(**11.57**)	(**9.82**)	(**8.99**)	(−1.00)
C3–C1	0.11	0.07	0.04	−0.07	0.15	0.08	0.06	−0.09
	(**2.42**)	(1.68)	(0.78)	(−1.55)	(**3.27**)	(**1.99**)	(0.99)	(−1.84)
	C.3. Stock returns				*C.4. Excluding downgrades*			
C1	1.06	1.10	1.17	0.11	1.19	1.23	1.15	−0.03
	(**4.52**)	(**4.66**)	(**5.27**)	(0.62)	(**5.12**)	(**5.16**)	(**5.25**)	(−0.18)
C2	1.18	1.11	1.06	−0.13	1.25	1.24	1.13	−0.12
	(**4.66**)	(**4.26**)	(**4.39**)	(−0.78)	(**4.89**)	(**4.81**)	(**4.73**)	(−0.71)
C3	1.29	1.26	0.99	−0.30	1.50	1.34	1.25	−0.25
	(**4.51**)	(**4.59**)	(**3.51**)	(−1.73)	(**5.29**)	(**5.23**)	(**4.56**)	(−1.38)
C3–C1	0.23	0.16	−0.18	−0.41	0.31	0.12	0.09	−0.21
	(1.18)	(1.05)	(−1.04)	(−1.84)	(1.61)	(0.73)	(0.48)	(−0.92)
Panel D: High idiosyncratic volatility half								
	D.1. Bond returns				*D.2. Excluding downgrades*			
C1	0.68	0.74	0.65	−0.02	0.70	0.76	0.73	0.05
	(**8.11**)	(**8.97**)	(**7.34**)	(−0.51)	(**8.36**)	(**9.15**)	(**7.72**)	(1.41)
C2	0.77	0.72	0.71	−0.06	0.82	0.77	0.78	−0.04
	(**9.90**)	(**8.77**)	(**8.06**)	(−1.30)	(**10.63**)	(**9.36**)	(**8.74**)	(−0.88)
C3	0.87	0.76	0.44	−0.43	0.90	0.93	0.86	−0.04
	(**10.46**)	(**7.47**)	(**3.46**)	(**−4.50**)	(**10.92**)	(**9.47**)	(**8.19**)	(−0.48)
C3–C1	0.19	0.02	−0.21	−0.41	0.20	0.17	0.13	−0.12
	(**2.31**)	(0.20)	(−1.71)	(**−4.06**)	(**2.42**)	(1.76)	(1.23)	(−1.43)
	D.3. Stock returns				*D.4. Excluding downgrades*			
C1	1.11	0.93	1.18	0.08	1.21	1.14	1.70	0.47
	(**3.60**)	(**2.77**)	(**3.06**)	(0.32)	(**4.00**)	(**3.34**)	(**4.16**)	(1.67)
C2	1.48	1.19	0.92	−0.56	1.75	1.52	1.50	−0.25
	(**3.92**)	(**2.98**)	(**2.29**)	(**−2.41**)	(**4.65**)	(**4.01**)	(**3.99**)	(−0.93)
C3	1.51	1.05	0.49	−1.01	1.56	1.44	1.52	−0.04
	(**3.33**)	(**2.18**)	(0.97)	(**−2.73**)	(**3.45**)	(**3.15**)	(**3.34**)	(−0.11)
C3–C1	0.40	0.12	−0.69	−1.07	0.35	0.29	−0.24	−0.52
	(1.34)	(0.41)	(**−2.19**)	(**−2.80**)	(1.09)	(0.93)	(−0.64)	(−1.22)

Table 4 (continued)

Sort on	Sort on Overpricing							
Credit Risk	Low	Medium	High	High−Low	Low	Medium	High	High−Low
Panel E: Low Amihud's illiquidity half								
	E.1. Bond returns				*E.2. Excluding downgrades*			
C1	0.64	0.67	0.69	0.05	0.66	0.69	0.72	0.05
	(**8.09**)	(**8.21**)	(**8.27**)	(**2.08**)	(**8.22**)	(**8.34**)	(**8.36**)	(1.65)
C2	0.70	0.71	0.65	−0.06	0.72	0.74	0.70	−0.02
	(**8.49**)	(**8.14**)	(**7.45**)	(−1.93)	(**8.60**)	(**8.29**)	(**7.87**)	(−0.59)
C3	0.75	0.73	0.65	−0.10	0.77	0.75	0.74	−0.03
	(**10.40**)	(**9.08**)	(**7.23**)	(−1.87)	(**10.82**)	(**9.28**)	(**8.50**)	(−0.54)
C3–C1	0.11	0.06	−0.04	−0.15	0.11	0.06	0.04	−0.07
	(**2.49**)	(1.19)	(−0.58)	(−**2.65**)	(**2.40**)	(1.32)	(0.60)	(−1.43)
	E.3. Stock returns				*E.4. Excluding downgrades*			
C1	1.02	1.06	1.00	−0.02	1.13	1.24	1.10	−0.03
	(**4.41**)	(**4.09**)	(**3.52**)	(−0.11)	(**4.92**)	(**4.83**)	(**3.67**)	(−0.13)
C2	1.15	1.23	0.82	−0.34	1.25	1.40	1.09	−0.16
	(**4.37**)	(**4.29**)	(**2.73**)	(−1.81)	(**4.70**)	(**4.92**)	(**3.57**)	(−0.74)
C3	1.28	1.17	0.76	−0.52	1.38	1.20	1.22	−0.16
	(**4.11**)	(**3.88**)	(**2.25**)	(−**2.45**)	(**4.32**)	(**4.17**)	(**3.75**)	(−0.72)
C3–C1	0.26	0.10	−0.24	−0.50	0.25	−0.03	0.11	−0.15
	(1.29)	(0.62)	(−1.14)	(−**2.06**)	(1.15)	(−0.20)	(0.46)	(−0.51)
Panel F: High Amihuds illiquidity half								
	F.1. Bond returns				*F.2. Excluding downgrades*			
C1	0.71	0.74	0.71	0.00	0.71	0.76	0.71	0.01
	(**9.11**)	(**8.49**)	(**7.92**)	(0.07)	(**9.28**)	(**8.70**)	(**7.68**)	(0.20)
C2	0.78	0.76	0.75	−0.03	0.85	0.80	0.82	−0.03
	(**10.42**)	(**9.16**)	(**8.13**)	(−0.65)	(**11.41**)	(**9.35**)	(**9.00**)	(−0.51)
C3	0.87	0.79	0.47	−0.39	0.89	0.94	0.88	−0.01
	(**10.89**)	(**7.95**)	(**3.96**)	(−**4.19**)	(**10.66**)	(**10.64**)	(**8.88**)	(−0.19)
C3–C1	0.16	0.05	−0.23	−0.39	0.18	0.18	0.16	−0.02
	(1.90)	(0.44)	(−1.89)	(−**3.97**)	(**2.09**)	(1.83)	(1.56)	(−0.24)
	F.3. Stock returns				*F.4. Excluding downgrades*			
C1	1.26	1.12	1.40	0.14	1.35	1.20	1.41	0.08
	(**4.76**)	(**4.28**)	(**4.85**)	(0.71)	(**5.20**)	(**4.72**)	(**5.22**)	(0.37)
C2	1.67	1.24	1.05	−0.61	1.86	1.50	1.50	−0.35
	(**5.04**)	(**3.40**)	(**2.64**)	(−**2.53**)	(**5.62**)	(**4.44**)	(**4.27**)	(−1.42)
C3	1.39	1.18	0.56	−0.79	1.51	1.62	1.70	0.19
	(**3.23**)	(**2.55**)	(1.15)	(−**2.33**)	(**3.63**)	(**3.75**)	(**3.78**)	(0.60)
C3–C1	0.13	0.06	−0.86	−0.95	0.16	0.42	0.29	0.08
	(0.46)	(0.18)	(−**2.29**)	(−**2.50**)	(0.57)	(1.28)	(0.79)	(0.21)

Table 5
Frequency and Impact of Financial Distress

We repeat the independent sorts on rating and overpricing from Table 3 and report the frequency, size, and returns around downgrades. Each panel has 2 subpanels—panels ending in .1. only include months following low sentiment ($SENTm^{\perp}_{t-1} < 0$), while those ending in .2. include only months following high sentiment ($SENTm^{\perp}_{t-1} > 0$). Panel A (B) reports the percentage of firms in each portfolio experiencing a rating change over the month (12 months) subsequent to the portfolio sort. Panel C reports the average size of the downgrade. Panel D (E) report average monthly returns during the distress period, defined as the period from 12 months before to 12 months after a rating downgrade. The numbers reported are the time-series average of the cross-sectional means, along with their sample t-statistics.

Sort on	Sort on Overpricing							
Credit Risk	Low	Medium	High	High−Low	Low	Medium	High	High−Low
Panel A: Downgrade frequency over next month (%)								
A.1. Low sentiment					*A.2. High sentiment*			
C1	0.76	1.30	1.98	1.21	0.98	1.67	2.41	1.42
	(**6.97**)	(**7.00**)	(**7.28**)	(**4.11**)	(**8.28**)	(**6.40**)	(**5.69**)	(**3.17**)
C2	0.79	1.21	1.96	1.17	0.86	1.48	2.18	1.31
	(**6.62**)	(**8.55**)	(**9.32**)	(**4.93**)	(**7.13**)	(**8.66**)	(**11.07**)	(**5.59**)
C3	0.57	1.22	1.94	1.37	0.55	1.26	1.98	1.43
	(**4.66**)	(**9.19**)	(**13.47**)	(**7.29**)	(**5.00**)	(**7.51**)	(**11.64**)	(**6.92**)
C3–C1	−0.20	−0.08	−0.04	0.16	−0.43	−0.41	−0.43	0.00
	(−1.28)	(−0.37)	(−0.14)	(0.49)	(−**2.81**)	(−1.29)	(−0.98)	(0.01)
Panel B: Downgrade frequency over next 12 months (%)								
B.1. Low sentiment					*B.2. High sentiment*			
C1	5.58	10.48	11.96	6.37	6.92	9.96	16.25	9.33
	(**16.66**)	(**24.83**)	(**16.02**)	(**7.54**)	(**21.80**)	(**18.02**)	(**17.79**)	(**8.84**)
C2	10.26	13.22	14.91	4.66	9.13	11.32	12.61	3.48
	(**24.62**)	(**29.24**)	(**26.02**)	(**7.37**)	(**28.69**)	(**24.09**)	(**20.46**)	(**5.60**)
C3	12.33	17.09	20.82	8.49	10.99	15.78	17.74	6.75
	(**20.24**)	(**25.49**)	(**32.46**)	(**11.96**)	(**17.34**)	(**26.75**)	(**28.82**)	(**7.52**)
C3–C1	6.74	6.61	8.86	2.12	4.07	5.82	1.49	−2.58
	(**9.86**)	(**8.89**)	(**11.55**)	(**2.27**)	(**6.18**)	(**7.85**)	(1.45)	(−**2.12**)
Panel C: Average size of downgrade (notches)								
C.1. Low sentiment					*C.2. High sentiment*			
C1	1.37	1.23	1.20	−0.04	1.58	1.31	1.33	−0.08
C2	1.12	1.33	1.34	0.19	1.83	1.42	1.41	−0.08
C3	1.07	1.37	1.41	0.04	1.38	1.33	1.49	0.12
C3–C1	−0.74	0.21	0.23	0.00	0.03	0.06	0.00	0.40

Table 5 (continued)

Sort on	Sort on Overpricing							
Credit Risk	Low	Medium	High	High−Low	Low	Medium	High	High−Low
Panel D: Bond return in distress period (%)								
	D.1. Low sentiment				*D.2. High sentiment*			
C1	0.56	0.61	0.63	0.08	0.71	0.70	0.75	0.04
	(**5.20**)	(**5.66**)	(**5.54**)	(1.64)	(**5.74**)	(**5.35**)	(**5.72**)	(0.56)
C2	0.66	0.67	0.72	0.06	0.63	0.63	0.45	−0.18
	(**5.53**)	(**6.10**)	(**5.47**)	(0.80)	(**5.13**)	(**4.93**)	(**3.43**)	(−**2.03**)
C3	0.78	0.81	0.82	0.04	0.59	0.36	−0.09	−0.68
	(**3.88**)	(**5.53**)	(**5.98**)	(0.22)	(**3.94**)	(**2.38**)	(−0.49)	(−**4.30**)
C3–C1	0.23	0.21	0.19	−0.04	−0.09	−0.34	−0.84	−0.74
	(1.11)	(1.44)	(1.31)	(−0.17)	(−0.59)	(−**2.21**)	(−**4.56**)	(−**4.16**)
Panel E: Stock return in distress period (%)								
	E.1. Low sentiment				*E.2. High sentiment*			
C1	0.88	1.14	1.17	0.29	0.41	0.02	0.53	0.15
	(**2.23**)	(**3.02**)	(**2.69**)	(0.82)	(0.91)	(0.04)	(1.00)	(0.30)
C2	1.85	1.20	1.57	−0.28	0.28	0.38	−0.71	−0.95
	(**3.92**)	(**2.35**)	(**2.99**)	(−0.61)	(0.59)	(0.71)	(−1.32)	(−**2.44**)
C3	1.35	1.82	0.95	−0.39	0.41	−0.47	−1.42	−1.71
	(1.74)	(**2.65**)	(1.33)	(−0.59)	(0.59)	(−0.69)	(−**1.98**)	(−**2.91**)
C3–C1	0.46	0.66	−0.22	−0.68	0.06	−0.58	−1.94	−1.73
	(0.69)	(1.36)	(−0.37)	(−0.89)	(0.11)	(−1.17)	(−**3.19**)	(−**2.62**)

Table 6
Fama-MacBeth Regressions

The table presents results from Fama-MacBeth type monthly cross-sectional regressions of month t risk-adjusted stock and bond returns on month $t-1$ dummy variables indicating underpricing, overpricing, overpricing over financially distressed periods, and other lagged control variables. Underpricing (Overpricing) is a dummy variable taking the value of 1 if the stock belongs to the most underpriced (overpriced) decile of stocks during month $t-1$, and 0 otherwise. Overpricing is also interacted with a dummy variable for financial distress, Distress, which takes the value of 1 from 12 months before to 12 months after an issuer rating downgrade and 0 when there is no rating change. Stock returns in Panel A are risk adjusted as in Brennan, Chordia, and Subrahmanyam (1998) by taking the intercept and residual from time-series regressions of each stock returns on the Fama and French (2015) five factors: MKT, SMB, HML, RMW, CMA. Bond returns in Panel B are adjusted similarly using the Fama and French (1993) 3 equity and 2 bond factors: MKT, SMB, HML, Term, and Def. The table reports the time-series average of the cross-sectional coefficients (all multiplied by 100), with their associated sample t-statistics in parentheses. The subpanels for low (high) sentiment average the cross-sectional regression coefficients only over months following low (high) sentiment $\text{SENTm}^{\perp}_{t-1} < 0$ ($\text{SENTm}^{\perp}_{t-1} > 0$). Leverage is LT debt over total assets and R_{t-1} (R^{b}_{t-1}) is the prior month's stock (bond) return.

	All months					Low Sentiment					High Sentiment				
Specification	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Panel A: Risk-adjusted stock returns															
Constant	0.32	0.32	0.58	0.60	1.55	0.27	0.27	0.45	0.45	0.94	0.37	0.37	0.71	0.73	2.14
	(**5.37**)	(**5.37**)	(**9.88**)	(**10.14**)	(**3.87**)	(**3.26**)	(**3.26**)	(**6.21**)	(**6.41**)	(1.72)	(**4.30**)	(**4.30**)	(**7.78**)	(**7.97**)	(**3.69**)
Underpricing	0.13	0.13	0.03	0.02	0.13	0.13	0.13	0.05	0.05	0.14	0.13	0.13	0.00	−0.01	0.13
	(1.34)	(1.34)	(0.28)	(0.19)	(1.44)	(1.09)	(1.09)	(0.43)	(0.40)	(1.18)	(0.84)	(0.84)	(0.02)	(−0.06)	(0.89)
Overpricing	−0.41	0.31	0.06	−0.28	−0.03	−0.35	0.05	−0.13	−0.26	−0.20	−0.47	0.57	0.24	−0.31	0.14
	(−**2.54**)	(1.77)	(0.33)	(−1.79)	(−0.15)	(−1.50)	(0.20)	(−0.54)	(−1.13)	(−0.89)	(−**2.08**)	(1.89)	(0.94)	(−1.40)	(0.56)
Overpricing×Distress		−1.90	−0.95		−0.90		−1.20	−0.49		−0.51		−2.58	−1.39		−1.28
		(−**6.78**)	(−**3.63**)		(−**3.50**)		(−**3.80**)	(−1.61)		(−1.66)		(−**5.68**)	(−**3.33**)		(−**3.13**)
Distress			−0.95	−1.02	−0.79			−0.71	−0.75	−0.66			−1.18	−1.28	−0.91
			(−**9.31**)	(−**9.86**)	(−**8.86**)			(−**5.09**)	(−**5.43**)	(−**5.15**)			(−**8.09**)	(−**8.49**)	(−**7.42**)
Amihud					−2.06					−1.49					−2.62
					(−1.63)					(−1.76)					(−1.11)
Turnover					0.40					−0.44					1.23
					(0.42)					(−0.35)					(0.87)
Rating					0.02					0.04					−0.00
					(0.89)					(1.55)					(−0.16)
Leverage					−0.22					−0.39					−0.05
					(−0.82)					(−1.09)					(−0.12)
R_{t-1}					−3.79					−3.14					−4.43
					(−**6.59**)					(−**4.30**)					(−**5.00**)
Log(Size)					−0.12					−0.08					−0.15
					(−**3.61**)					(−1.90)					(−**3.14**)
Log(BM)					0.06					0.10					0.02
					(1.25)					(1.61)					(0.25)

Table 6
Fama-MacBeth Regressions (continued)

	All months					Low Sentiment					High Sentiment				
Specification	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Panel B: Risk-adjusted bond returns															
Constant	0.45	0.45	0.51	0.52	0.27	0.49	0.49	0.50	0.51	0.15	0.42	0.42	0.52	0.53	0.39
	(**20.55**)	(**20.55**)	(**23.77**)	(**23.74**)	(**4.62**)	(**18.67**)	(**18.67**)	(**19.59**)	(**19.55**)	(1.87)	(**11.91**)	(**11.91**)	(**15.06**)	(**15.13**)	(**4.61**)
Underpricing	0.03	0.03	0.01	0.00	0.04	−0.01	−0.01	−0.02	−0.02	0.04	0.07	0.07	0.03	0.02	0.04
	(1.46)	(1.46)	(0.30)	(0.17)	(**2.23**)	(−0.26)	(−0.26)	(−0.63)	(−0.63)	(**2.06**)	(**2.20**)	(**2.20**)	(0.90)	(0.74)	(1.27)
Overpricing	−0.20	0.04	−0.02	−0.17	−0.02	−0.02	0.02	0.01	−0.01	−0.02	−0.38	0.05	−0.05	−0.32	−0.02
	(−**3.99**)	(0.99)	(−0.58)	(−**3.50**)	(−0.66)	(−0.59)	(0.51)	(0.12)	(−0.27)	(−0.49)	(−**4.18**)	(0.86)	(−0.82)	(−**3.77**)	(−0.45)
Overpricing×Distress		−0.56	−0.37		−0.30		−0.17	−0.11		−0.05		−0.95	−0.63		−0.54
		(−**6.18**)	(−**4.54**)		(−**3.89**)		(−1.64)	(−1.16)		(−0.56)		(−**6.63**)	(−**4.83**)		(−**4.67**)
Distress			−0.19	−0.21	−0.15			−0.06	−0.07	−0.08			−0.32	−0.36	−0.22
			(−**7.19**)	(−**7.66**)	(−**7.14**)			(−1.64)	(−1.81)	(−**2.79**)			(−**8.90**)	(−**9.31**)	(−**7.24**)
Age (years)					−0.01					−0.00					−0.01
					(−1.63)					(−1.06)					(−1.24)
Bond rating					0.01					0.03					−0.01
					(1.82)					(**3.98**)					(−0.97)
Bond duration					0.02					0.02					0.02
					(**2.99**)					(**2.02**)					(**2.22**)
Amount outstanding					0.01					−0.03					0.06
					(0.18)					(−0.30)					(0.52)
Leverage					−0.10					−0.06					−0.14
					(−1.56)					(−0.76)					(−1.38)
R^b_{t-1}					1.03					1.59					0.48
					(0.97)					(1.11)					(0.31)
$R^b_{t-7:t-2}$					1.48					0.72					2.21
					(**3.31**)					(1.23)					(**3.32**)

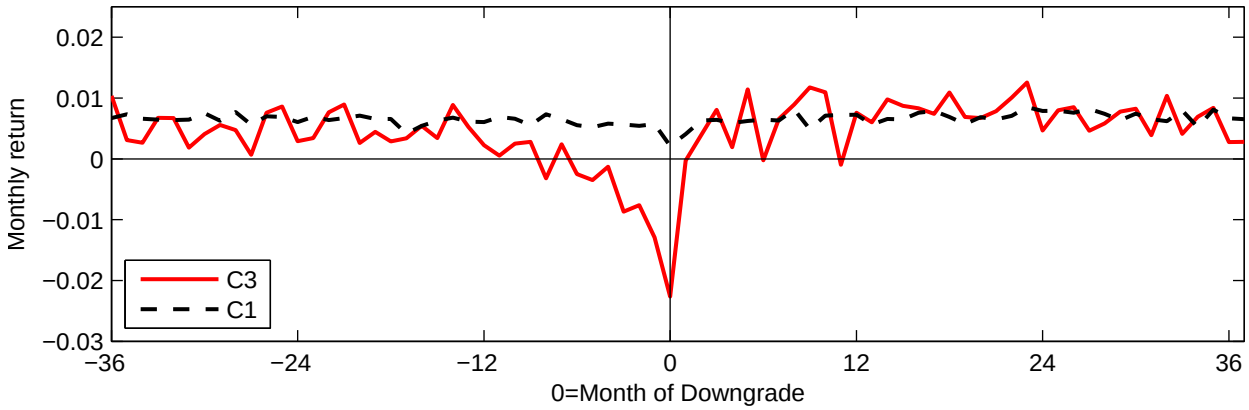
Table 7
Bond-Stock Correlations
in Double Sorts on Rating and Overpricing

The table reports the time-series average of the cross-sectional correlation between the returns of bonds and stocks of the same firm in portfolios independently sorted on credit risk and overpricing. Each month t, firms are sorted independently on month-t credit risk and overpricing. Within each portfolio, we compute the cross-sectional correlation between bond and stock returns over month $t+1$. Each panel has 2 subpanels. Panel 1 includes all available firm-level return observations, while panel 2 excludes observations from 12 months before to 12 months after rating downgrades. Panel A (B) report these correlations in months following low (high) monthly sentiment $\text{SENTm}^{\perp}_{t-1} < 0$ ($\text{SENTm}^{\perp}_{t-1} > 0$).

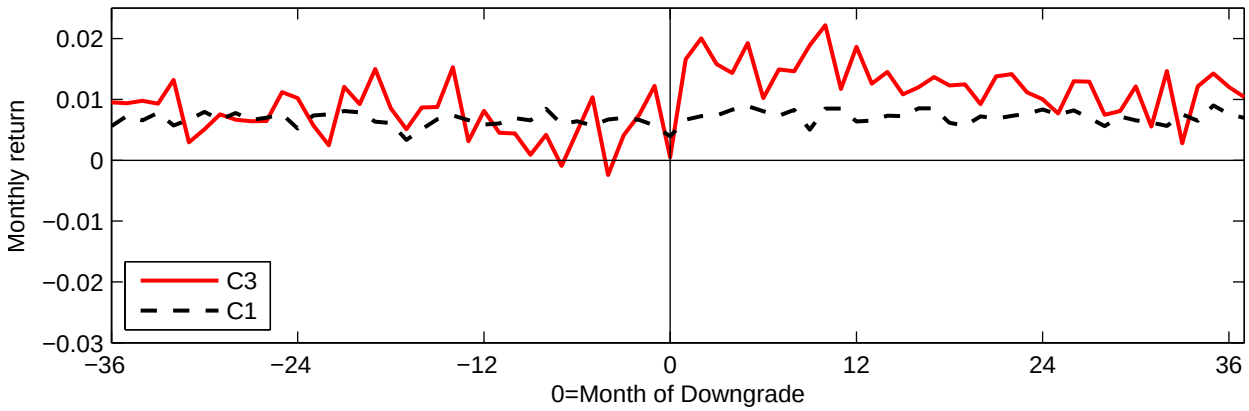
Sort on	Sort on Overpricing							
Credit Risk	Low	Medium	High	High−Low	Low	Medium	High	High−Low
Panel A: LOW Monthly sentiment								
	A.1. All observations				*A.2. Excluding financial distress*			
C1	4.30	3.47	3.57	−0.76	4.07	3.94	3.09	−1.15
	(**2.85**)	(1.86)	(1.69)	(−0.31)	(**2.93**)	(**2.10**)	(1.25)	(−0.40)
C2	9.49	12.71	12.64	3.16	6.71	11.60	11.16	4.45
	(**5.80**)	(**7.39**)	(**6.48**)	(1.29)	(**4.05**)	(**6.14**)	(**5.77**)	(1.84)
C3	14.27	17.90	23.73	9.46	12.37	14.03	20.43	8.06
	(**7.61**)	(**9.52**)	(**14.85**)	(**4.36**)	(**5.76**)	(**7.20**)	(**12.23**)	(**3.21**)
C3–C1	9.97	14.02	20.33	9.88	8.31	10.17	17.82	9.13
	(**4.41**)	(**5.85**)	(**8.23**)	(**3.11**)	(**3.73**)	(**4.23**)	(**6.36**)	(**2.63**)
Panel B: HIGH Monthly sentiment								
	B.1. All observations				*B.2. Excluding financial distress*			
C1	7.75	3.50	7.51	−1.71	8.01	1.85	10.01	0.19
	(**5.53**)	(1.56)	(**2.86**)	(−0.59)	(**5.10**)	(0.76)	(**3.68**)	(0.06)
C2	6.62	7.86	11.43	4.81	6.69	8.96	6.03	−0.66
	(**4.19**)	(**4.57**)	(**5.89**)	(**2.14**)	(**4.15**)	(**4.55**)	(**2.85**)	(−0.26)
C3	11.97	20.40	24.05	12.10	12.48	18.57	20.58	7.98
	(**5.59**)	(**10.56**)	(**12.44**)	(**4.94**)	(**5.59**)	(**8.76**)	(**11.17**)	(**3.20**)
C3–C1	4.40	16.86	18.46	13.67	4.37	16.79	15.45	8.67
	(**2.00**)	(**6.93**)	(**5.87**)	(**4.11**)	(1.73)	(**6.41**)	(**4.81**)	(**2.15**)

Figure 1. Impact of downgrades on the returns of over- and underpriced firms. Each month, all firms priced above $1 and rated by Standard & Poor's with available return data in CRSP are divided into terciles based on their prior month credit rating. For each tercile, Plot A (D) report the equally weighted average bond (stock) return around periods of issuer rating downgrades, where month 0 is the month of the downgrade. Plot B (E) average returns only over firms that are underpriced at the time of downgrade, while Plot C (F) average returns only over overpriced firms. An under (over) priced firm is a firm whose SYY overpricing measure (based on variables as in ACJP13) is below (above) the median for the month.

Plot A: Impact of issuer downgrades on bond returns



Plot B: Impact of issuer downgrades on bond returns of underpriced firms



Plot C: Impact of issuer downgrades on bond returns of overpriced firms

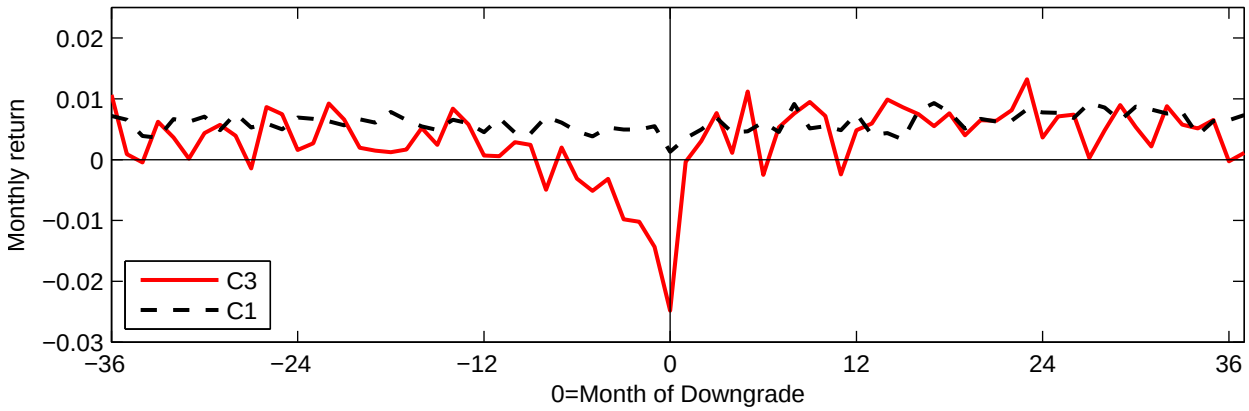
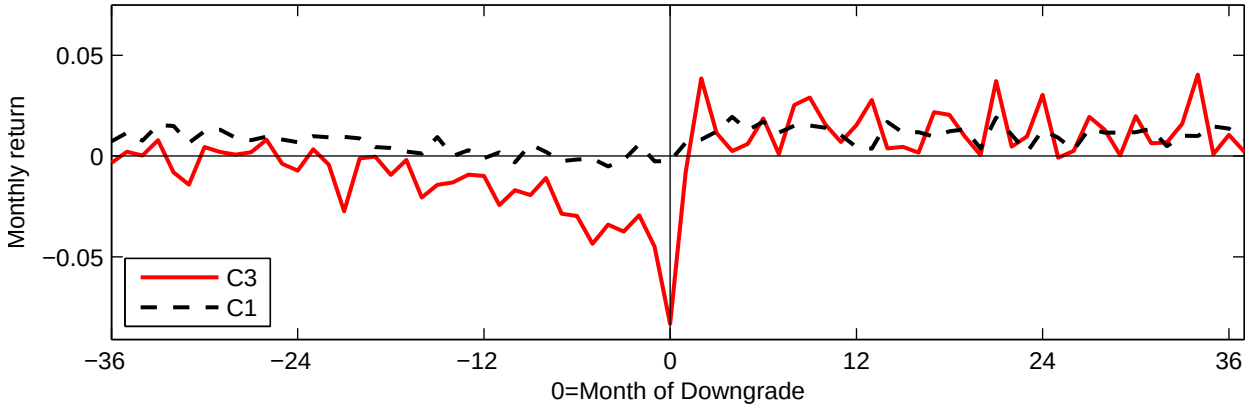
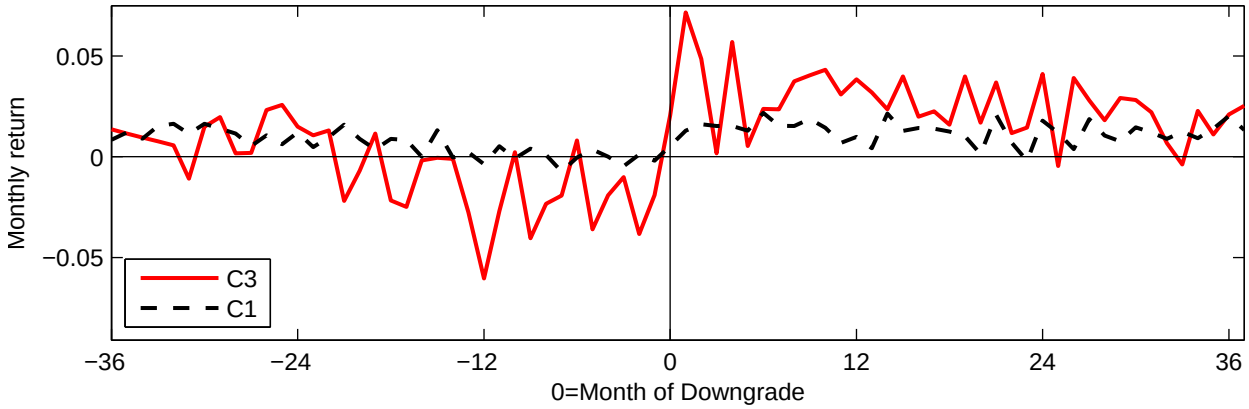


Figure 1. Impact of downgrades on over- and underpriced firms (continued).

Plot D: Impact of issuer downgrades on stock returns



Plot E: Impact of issuer downgrades on stock returns of underpriced firms



Plot F: Impact of issuer downgrades on stock returns of overpriced firms

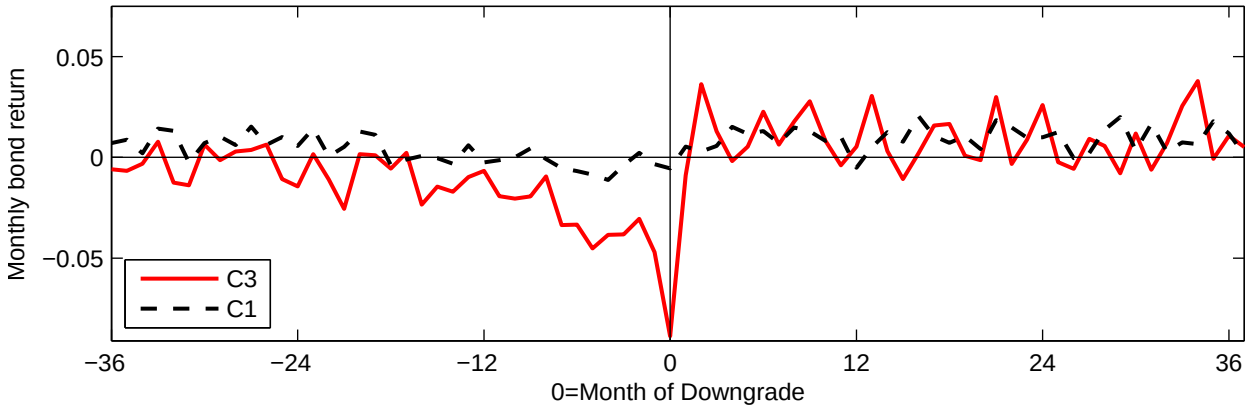
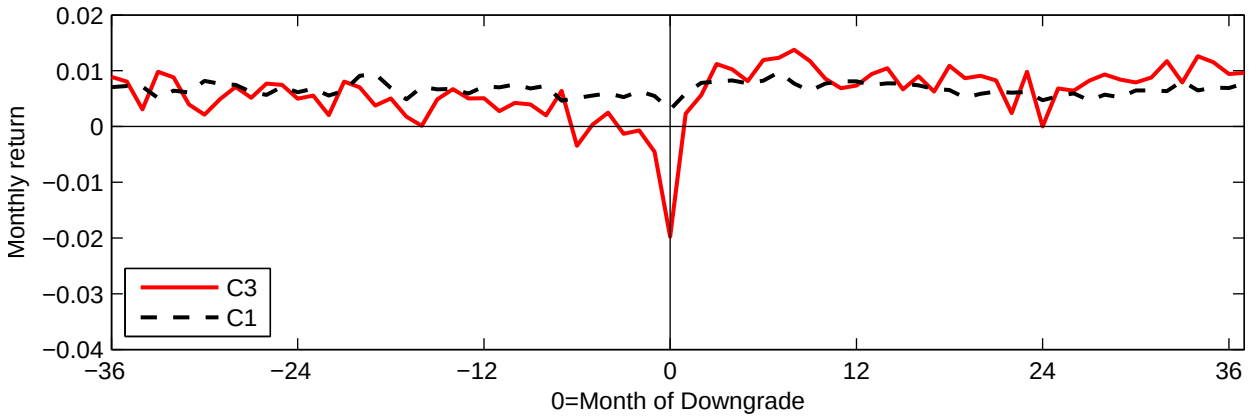
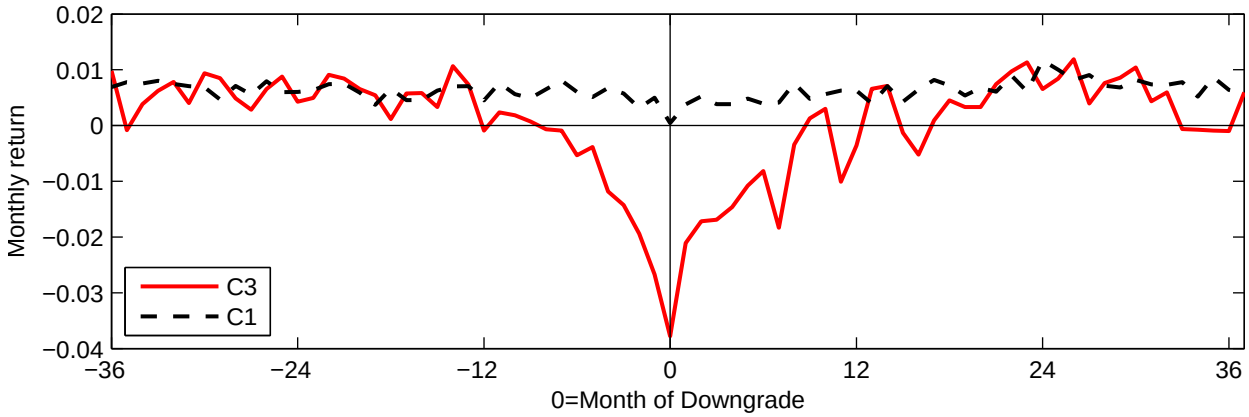


Figure 2. Impact of downgrades in high and low sentiment. We repeat the sorts in Figure 1, but divide the sample into downgrades occuring following high or low sentiment.

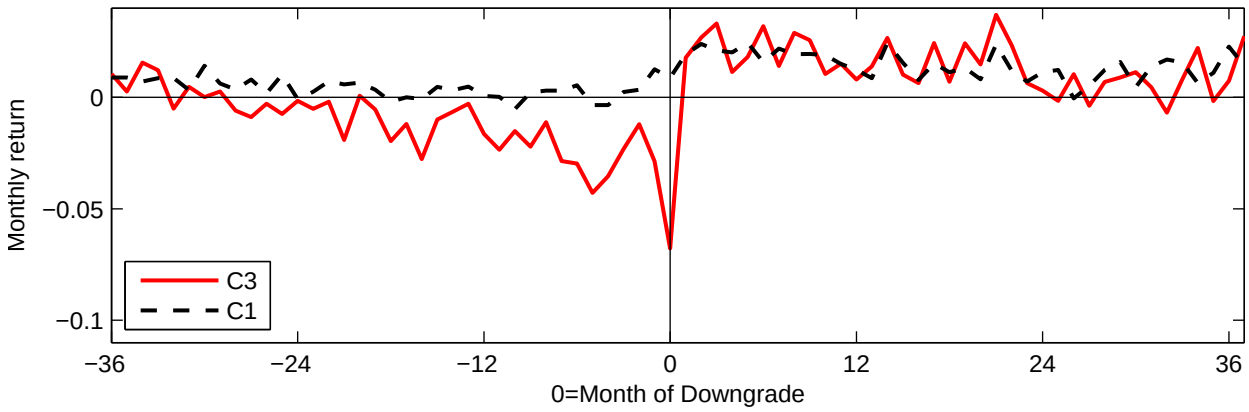
Plot A: Impact of downgrades on bond returns in low sentiment (Annual $\text{SENT}^{\perp}_{t-1} < 0$)



Plot B: Impact of downgrades on bond returns in high sentiment (Annual $\text{SENT}^{\perp}_{t-1} > 0$)



Plot C: Impact of downgrades on stock returns in low sentiment (Annual $\text{SENT}^{\perp}_{t-1} < 0$)



Plot D: Impact of downgrades on stock returns in high sentiment (Annual $\text{SENT}^{\perp}_{t-1} > 0$)

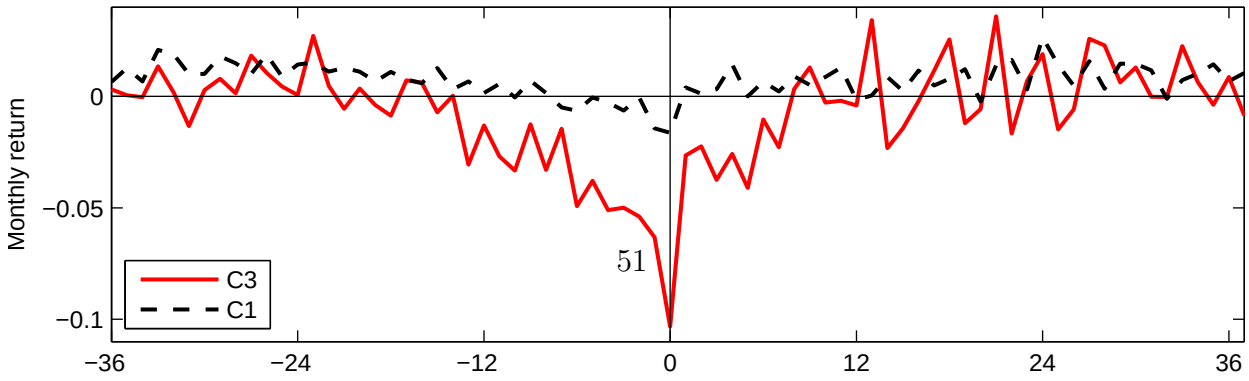
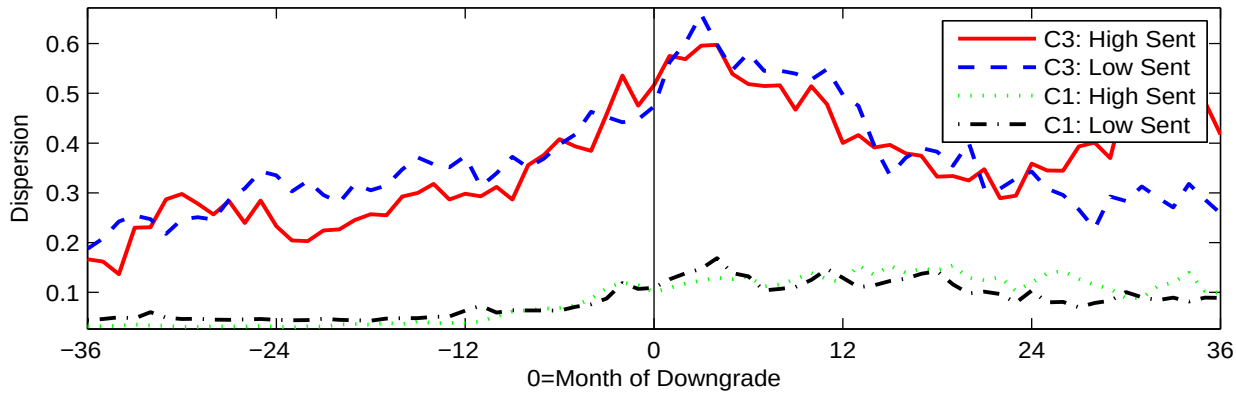
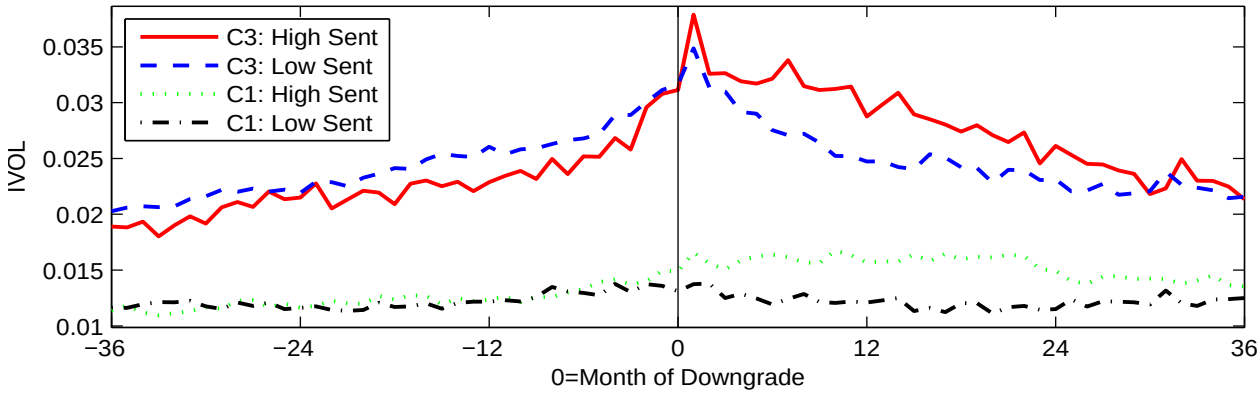


Figure 3. Impact of downgrades on fundamental uncertainty in high and low sentiment. We repeat the sorts in Figure 2, but examine the change in fundamental uncertainty around downgrades following high or low monthly sentiment.

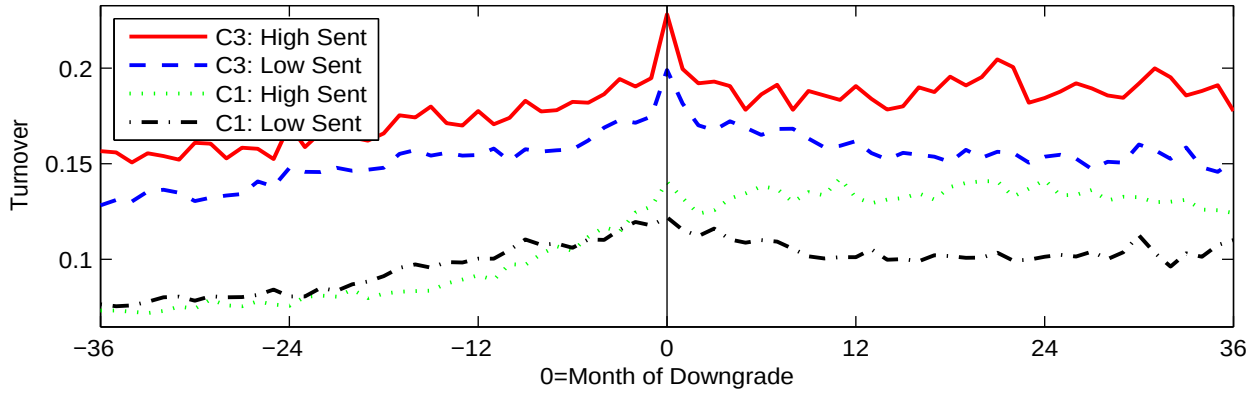
Plot A: Impact of downgrades on analyst dispersion in high and low sentiment



Plot B: Impact of downgrades on idiosyncratic volatility in high and low sentiment



Plot C: Impact of downgrades on turnover in high and low sentiment



Plot D: Impact of downgrades on Amihud's illiquidity in high and low sentiment

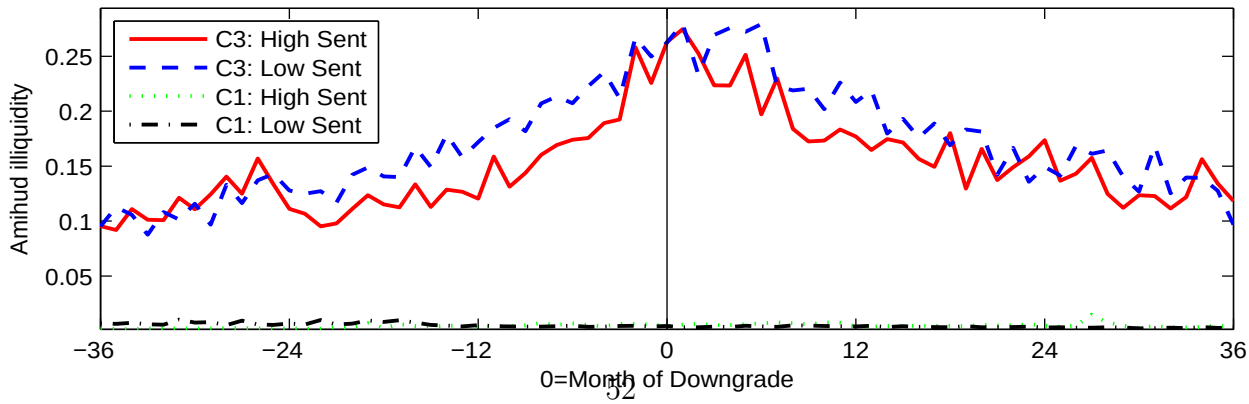
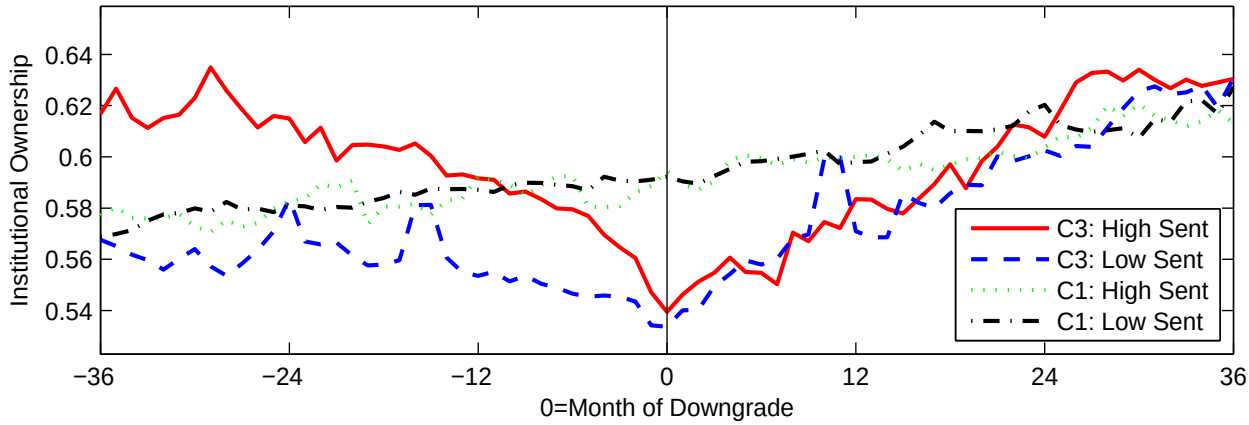


Figure 4. Institutional ownership around downgrades following high and low sentiment. We repeat the sorts in Figure 2, but examine institutional ownership following high or low monthly sentiment. Institutional ownership is measured as the number of shares held by institutions (from Thompson Financial) as a percentage of total shares outstanding.

Plot A: Institutional ownership around downgrades in high and low sentiment



Plot B: Breadth of institutional ownership (number of owners)