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ABSTRACT

This study explores the relation between investor sentiment in the equity market and investments in corporate-bond funds. Investors tend to move into and out of corporate-bond funds when contemporaneous investor sentiment in equity market differs from historical average. Specifically, a one-standard-deviation decrease in equity-market sentiment generates 0.1% and 0.4% inflows for active and index funds, respectively. It reflects the time-varying flight-to-safety behavior of investors. However, the corporate-bond funds with negative or low exposure to equity-market sentiment appear to attract inflows and funds with positive or high exposure to equity-market sentiment experience outflows, indicating that investors are likely to avoid sentiment risk. Out-of-sample analysis shows that corporate-bond funds with the highest negative sentiment exposure significantly outperform the funds with the highest positive sentiment exposure by 2.22%-2.52% per year. The results are pervasive across active and index funds, present in different periods and robust to using composite sentiment metrics.

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1. Introduction

Investors tend to shift between riskier assets and safer assets when their asset allocation decisions are influenced by changes in market sentiment. Low sentiment in equity market is likely to induce investors to switch from equity funds to bond funds which produces more inflows for bond funds. Although increased capital assists fund managers to expand portfolio, massive inflows may propel fund managers to make investment decisions at inappropriate times or prices. In contrast, high sentiment in equity market tend to persuade investors to redeem capital from bond funds which exerts fire-sale pressure on bond funds with inadequate liquidity buffer. If sentiment-induced flows cause fund managers to make suboptimal trading decisions, poor future performance of funds is more likely. This study examines the sensitivity of investor flows and performance of corporate-bond funds (CBFs) to investor sentiment in the equity market.

Wave of investor sentiment in the equity market reflect changes in investors' risk preferences. Falling sentiment in equity market induces investors to move from the riskier assets to the safer assets as they become more risk averse during stressed times. Hence, they shift from speculative stocks to safer stocks or shift away from equities when sentiment in equity market declines. In contrast to the common presumption that retail investors are sentiment-prone investors, Griffin *et al.* (2011); DeVAULT, Sias and Starks (2019) show that institutional investors also switch between volatile and safe stocks when sentiment changes. Investors shift their investments from equity funds to bond funds when sentiment worsens (Da, Engelberg and Gao, 2015). As corporate-bond funds are relatively safer investment compared to equity funds, it is likely that bond funds attract inflows when investor sentiment in equity market weakens. CBFs are likely to attract the investors seeking flight to safety during low sentiment periods because CBFs hold relatively safer assets. Besides, it is likely that investors continue to prefer outperforming funds during low sentiment periods (Warther, 1995; Sirri and Tufano, 1998).

Although low sentiment in equity market leads flows to bond funds, fund exposure to equity-market sentiment along with fund characteristics should matter to investors. Fund exposure to equity-market sentiment reflects the sensitivity of fund performance to investor sentiment in the equity market. Overall sentiment exposure fund depends on sensitivity of its holdings to the movement of equity-market sentiment. Fund characteristics and portfolio management strategies also have effect on the sentiment exposure. A positive(negative) sentiment exposure coefficient of fund implies that fund portfolio contains more(less) securities whose returns comove positively with equity-market sentiment and less(more) securities whose returns comove negatively with equity-market sentiment. Sentiment-prone investors direct

their capital to those funds which invest in high-sentiment securities (Frazzini and Lamont, 2008). However, Massa and Yadav (2015) find that equity funds with less exposure to investor sentiment attract more inflows because they earn superior performance. Contrarian and risk-averse investors tend to choose CBFs with less exposure to equity-market sentiment.

Although trading decisions of fund managers should not depend on fund flows in a frictionless market with adequate liquidity, unanticipated flows in response to changes in equity-market sentiment may induce fund managers to take unplanned trading decisions. Therefore, sentiment-induced flows are likely to result in underperformance of CBFs, which are highly exposed to investor sentiment in the equity market. Moreover, when equity-market sentiment declines, CBF holdings tend to be overvalued for flow-induced price pressure in bond market with high inflows. This flow driven mispricing is likely to be stronger as corporate-bond market is relatively illiquid. Moreover, the dominant presence of institutional investors in corporate-bond market is unlikely to alleviate mispricing as they also engage in sentiment-induced trading (Brunnermeier and Nagel, 2004). Both equity and hedge funds with negative sentiment exposure outperform funds with positive sentiment exposure (Massa and Yadav, 2015; Zheng, Osmer and Zhang, 2018). It suggests that CBFs with low sentiment exposure outperform CBFs with high sentiment exposure.

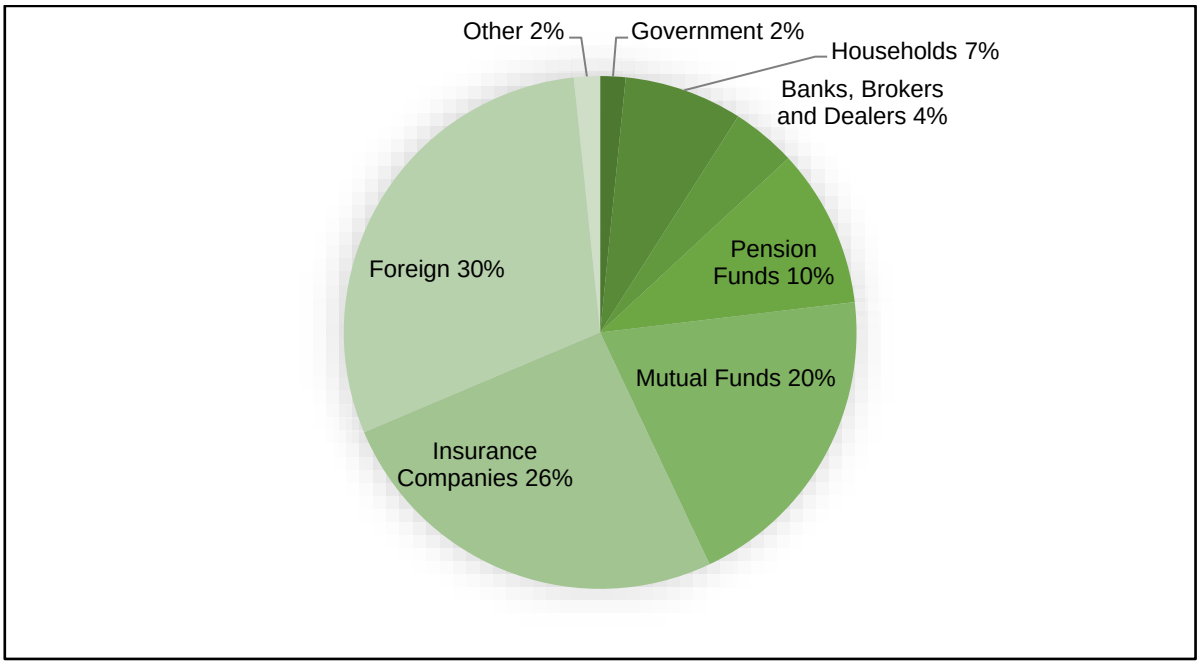

Figure 1. US corporate-bond holdings by investor type, 2018. The chart is based on aggregating data from table L.213. (Source: Board of Governors of the Federal Reserve System, 2020)

Fixed income mutual funds, particularly CBFs, have experienced multiple times more inflows relative to equity, money-market, and other type of funds following the great recession (Goldstein, Jiang and Ng, 2017; Choi *et al.*, 2020). The growth of assets managed by CBFs over the past decade is noteworthy. Total assets under management in corporate-bond funds

and loan-mutual funds have risen to over $2 trillion in the past decade (Board of Governors of the Federal Reserve System, 2018). Besides, mutual-fund industry holdings of outstanding corporate bonds reached to around 20% in 2018 from 12% in 2008 (see Figure 1). Regulators have become concerned with the drivers influencing bond-fund flows because massive outflows from bond funds would expose the debt market to financial instability. It is worthwhile to understand the extent to which equity-market sentiment influences investments in CBFs.

I use the market-based composite sentiment index (BW) constructed by Baker and Wurgler (2006) to quantify equity-market sentiment. By using the sentiment index level over its time-series mean as a measure of current equity-market sentiment, I show that low(high) equity-market sentiment drives flows into(out of) the corporate-bond funds. Besides, I examine the relation between sentiment exposure and flows of CBFs. I adopt Zheng, Osmer and Zhang (2018) sentiment exposure model to estimate CBF exposure to equity-market sentiment. This model examines how CBF's sentiment exposure coefficient in specific month varies when realized equity-market sentiment in month *t* is higher (or lower) than the past time-series average of equity-market sentiment. This model is distinctive as it incorporates past sentiment. I document that CBF flows are negatively influenced by fund exposure to equity-market sentiment. Specifically, funds with negative exposure to equity-market sentiment attract inflows while funds with positive exposure to equity-market sentiment experience outflows. I also provide evidence that equity-market sentiment exposure of CBF negatively predicts future performance. Specifically, CBFs with negative or low exposure to equity-market sentiment exhibit superior performance compared to the CBFs with positive or high exposure to equity-market sentiment. Therefore, it would be a costly mistake of investors if they direct their money to CBFs with high exposure to equity-market sentiment.

This study contributes to the growing literature on investor sentiment and corporate-bond funds in following ways. First, effect of investor sentiment on the cross-section of asset returns is well documented in existing literature (i.e. Baker and Wurgler, 2006; Nayak, 2010; Stambaugh, Yu and Yuan, 2012). Hence, market-sentiment is an important driver for fund flows and performance. However, existing research on investor sentiment (i.e. Frazzini and Lamont, 2008; Massa and Yadav, 2015; Zheng, Osmer and Zhang, 2018) focuses on equity funds and hedge funds. To the best of my knowledge, this is the first study to quantify the effect of investor sentiment in the equity market on investments in corporate-bond funds. Second, despite the growing concern of regulators over corporate-bond funds, the research on bond funds is significantly lower than that on equity funds. As Goldstein, Jiang and Ng (2017) document significant growth of assets held by corporate-bond funds relative to other bond funds in recent years, this paper aims to fill the gap by concentrating on the corporate-

bond funds. Third, as fund managers have varying preference level for equity-market sentiment exposure of their portfolio, investigating investors' preference for CBFs with different level of sentiment exposure and long-term performance of CBFs is critical. Fourth, since CBFs with low exposure to equity-market sentiment outperform and investors tend to direct flows to these funds, this study complements the literature on flow-performance relations of corporate-bond funds.

This study has implications for understanding fund investors' asset allocation decisions related to changes in equity-market sentiment and knowing the outcome of having different degree of equity-market sentiment exposure by corporate-bond funds. The study is structured as follows. Section 2 discusses the hypothesis development. Section 3 outlines the data and methodology. Section 4 presents the empirical results. Section 5 offers conclusions.

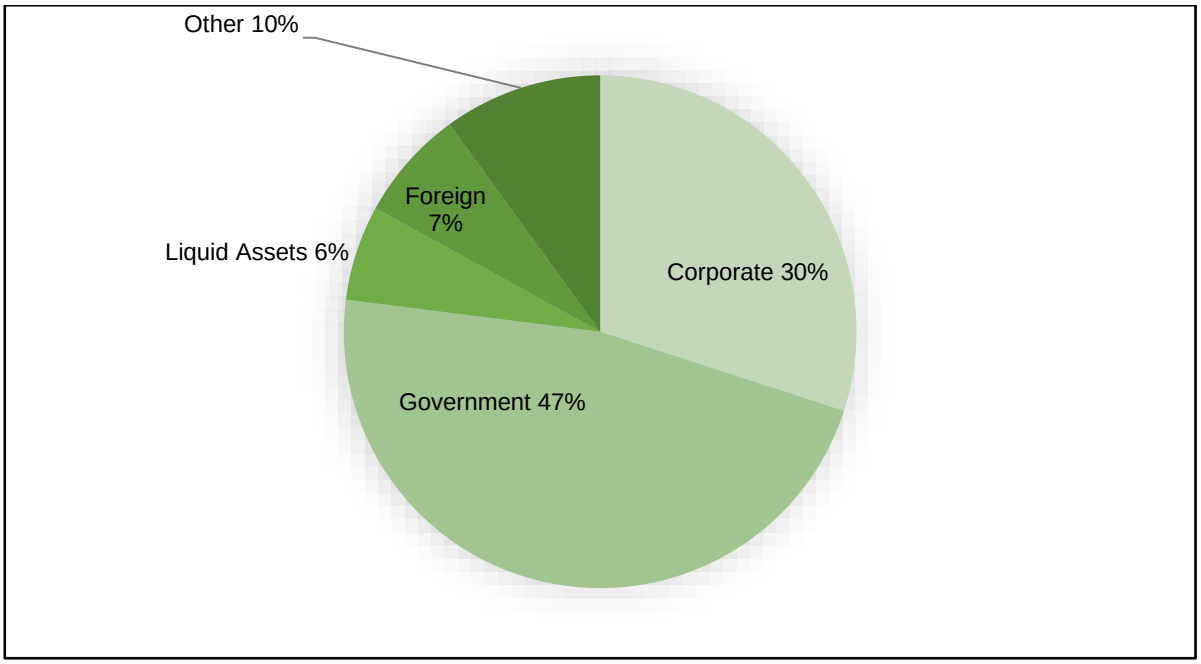

Figure 2. Portfolio composition of investment-grade corporate-bond funds as of September 2018. (Source: Investment Company Institute, 2019).

2. Background and hypothesis development

2.1. Background

Mutual fund flows have considerable impact on illiquid corporate-bond market because corporate-bond funds' market share in corporate-bond market has grown significantly over time. CBFs are primarily categorized into investment-grade and high-yield based on their investment objective. Assets managed by investment-grade CBFs constitute around 83% of the assets managed by both type of funds (Investment Company Institute, 2019). Despite the common assumption that these funds' portfolio is primarily composed of investment-grade

corporate bonds, almost half of their portfolio is allocated to treasury and government agency securities, and less than one-third of portfolio is allocated to corporate bonds (see Figure 2). Therefore, the safety offered by investment-grade CBFs may attract investors seeking safer assets during low sentiment periods in equity market.

Investment-grade corporate bonds share common characteristics with government bonds while high-yield corporate bonds have similarities with speculative stocks. Baker and Wurgler (2012); Laborda and Olmo (2014) document positive relation between investor sentiment and excess returns on government bonds. Moreover, Nayak (2010); Chen (2015) find that investor sentiment predicts future returns on corporate bonds negatively. They find that corporate bonds earn higher returns following the low sentiment period and lower returns following the high sentiment period. Though Nayak (2010) attributes the misprcing to sentiment-induced biasness in the projection of future cash flows and risks, Chen (2015) argue that backflow of capital in bond market for changes in equity-market sentiment is responsible for predictability of subsequent bond returns.

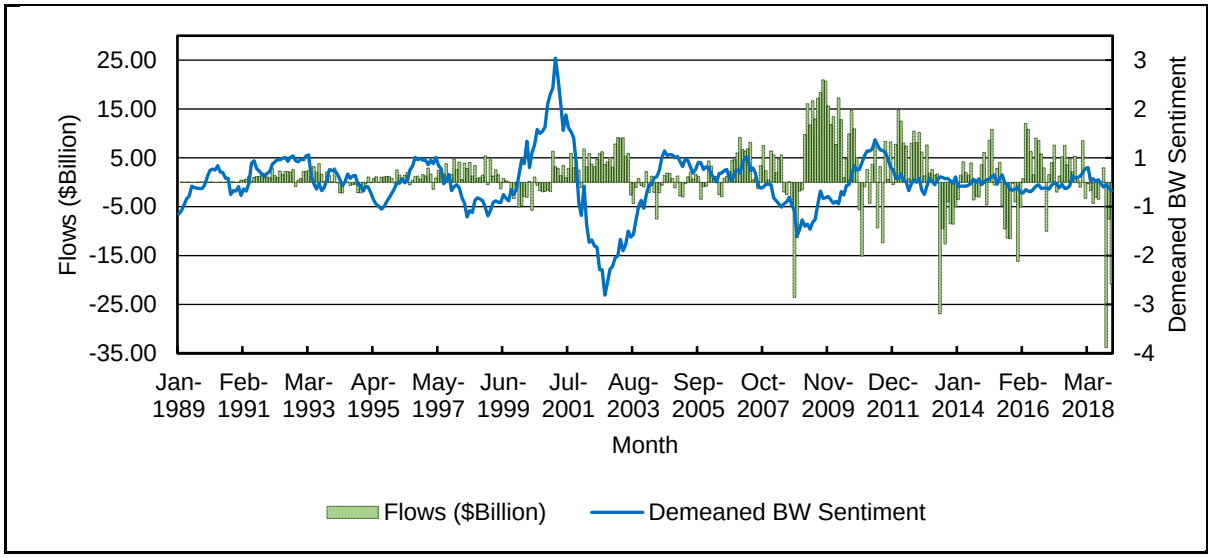

Figure 3. Aggregate dollar flows of corporate-bond funds and demeaned BW sentiment index for equity market from January 1989 to December 2018. The positive and negative bars reflect dollar inflows and outflows, respectively. BW sentiment index is demeaned by taking index value over the past 24-month historical average.

Figure 3 portrays the monthly aggregate dollar flows of CBFs in my sample and the BW sentiment index over the previous 24-month historical average. The aggregate net flows in CBFs depict considerable amount of volatility along with the changes of investor sentiment in the equity market throughout the sample period. It seems that corporate-bond-fund flows and equity-market sentiment move in opposite direction over time. CBFs receive net inflows when equity-market sentiment decreases from March 2001 to September 2002 and experience net outflows when sentiment measure rose from July 2003 to May 2004. Moreover, CBFs generated substantial amount of inflows consistently from January 2009 to July 2010 and from

February 2016 to August 2017 when equity-market sentiment was negative. Increased long-term interest rate and flattening treasury yield curve in 2018 led significant outflows from CBFs.

2.2. Hypothesis development

The main hypotheses of this study are based on the notion that changes in investor sentiment induces investors to revisit their asset allocation decisions. When investor sentiment in equity market becomes low, investors get pessimistic about future return from their equity investment and they tend to shift capital from the equity market to the bond market. Thus, changes in investors' sentiment tend to influence flows to corporate-bond funds (Ben-Rephael, Kandel and Wohl, 2012; Akbas *et al.*, 2015).

Based on the sentiment-induced trading behavior of investors, I expect CBFs experience greater inflows from investors and face less redemption requests from investors when sentiment in equity market deteriorates. As investors tend to invest disproportionately more money to outperforming funds, I expect CBFs with strong recent performance attract more inflows during low sentiment periods. Therefore, my first set of hypotheses are :

Hypothesis 1a. Corporate-bond funds generate inflows when equity-market sentiment worsens and face outflows when equity-market sentiment strengthens.

Hypothesis 1b. Corporate-bond funds with high past performance attract more inflows when investor sentiment in equity market worsens.

Although flows into and out of CBFs tend to be affected by fluctuation of equity-market sentiment, the responsiveness of flows to the changes in equity-market sentiment should differ based on the fund exposure to equity-market sentiment. As more exposure to equity-market sentiment leads fund to take more sentiment risk, risk-averse investors prefer investing in CBFs with negative equity market sentiment exposure. Therefore, my second hypothesis is:

Hypothesis 2. Corporate-bond funds with negative or low exposure to equity-market sentiment attract flows and funds with positive or high exposure to equity-market sentiment experience outflows.

If fund investors direct their investments to CBFs in response to low sentiment in equity market, such sentiment-driven flows tend to have effect on fund performance. Unprecedented flows to CBFs in response to fluctuation of sentiment in equity market may cause fund managers to make suboptimal trading decisions. Funds with large inflows tend to expand existing positions or open position in newly-issued overpriced securities which causes poor performance in future (Coval and Stafford, 2007; Lou, 2012). However, Choi *et al.*, (2020)

suggest that CBFs can open position in new bond issues rather than expand existing position. CBFs can avoid flow-induced trading by keeping their unexpected inflows in cash till appropriate time and maintaining adequate liquidity for meeting redemptions. But, opportunity costs of holding cash and low-yielding treasury bonds is not trivial for CBFs. It is challenging to disentangle sentiment-induced flows from flows. Hence, I assume that sentiment exposure of fund captures sentiment-induced flows of fund. As CBFs having low exposure to equity-market sentiment can avoid flow-induced trading, outperformance is more likely for such funds. Thus, my final hypothesis is:

Hypothesis 3. Corporate-bond funds with negative or low exposure to equity-market sentiment outperform the funds with positive or high exposure to equity-market sentiment.

3. Sample construction and empirical measurements

3.1. Sample construction

The sample comprises US open-end corporate-bond funds from January 1989 to December 2018. Data on fund returns and characteristics come from the Center for Research in Security Prices (CRSP). Since I use minimum 30 months of data to estimate the alpha and the equity-market sentiment exposure of individual funds, empirical analysis starts from June 1991. I consider individual fund share class as unit of observation.

I identify corporate-bond funds using the objective codes offered by CRSP. As no single source continues for full-time range, I use all available sources for identifying corporate-bond funds following Goldstein, Jiang and Ng (2017). I require at least 30-month consecutive time-series observations for a fund to be included in sample. Final sample contains 4,378 distinct fund share classes of which 4,323 funds are active funds and 55 funds are index funds.

3.2. Measurement of equity-market sentiment and sentiment exposure

I use the market-based sentiment index to capture monthly sentiment in equity market. Specifically, I take the sentiment index over its sample mean to quantify equity-market sentiment. Sentiment in month t is defined as:

$$Sentiment_t = Sent_{m,t} - \overline{Sent} \quad (1)$$

where $Sent_{m,t}$ denotes equity-market sentiment index for month *t* and $\overline{Sent}$ is the time-series average of equity-market sentiment index estimated from the previous 24 months, respectively. When the sentiment proxy in current month is above the historical average, investors are optimistic about future stock market. In contrast when the sentiment proxy in

current month is below the historical average, investors are pessimistic about future stock market.

I use the investor sentiment index constructed by Baker and Wurgler (2006) for primary analysis. This ubiquitous sentiment index was originally constructed on first principal component of six equity-market based sentiment proxies. However, the authors have dropped NYSE share turnover variable recently as the definition of turnover has changed for the rise of high-frequency trading and the migration of trading to various venues. Hence, the current version of the BW sentiment index is based on five sentiment proxies: closed-end fund discount, the number and average first-day returns on IPOs, the equity share in new issues, and the dividend premium.[1] For robustness purpose, I also utilize the HJTZ sentiment index constructed by Huang *et al.* (2015). HJTZ sentiment index extracts the most appropriate common components from the information contents of Baker and Wurgler's six equity-market based sentiment proxies by utilizing the partial least square method. Investor-sentiment studies (i.e. Stambaugh, Yu and Yuan, 2012; Bi and Zhu, 2020) use these indexes to measure market sentiment. Both sentiment proxies are used in orthogonalized form, orthogonalized to macroeconomic variables. Sentiment indexes data come from the website of respective authors.

I adopt the sentiment exposure model of Zheng, Osmer and Zhang (2018) to estimate the CBF exposure to equity-market sentiment. Capital asset pricing model (CAPM) for corporate-bond market can be written as follows:

$$R_{i,t} = \alpha_i + \beta_{m,i} R_{m,t} + \varepsilon_{i,t},\ t = 0, \ldots\ldots, T-1 \tag{2}$$

where $R_{i,t}$ is the excess return for corporate-bond fund *i* in month *t* and $R_{m,t}$ is the excess return on the Vanguard Total Bond Market Index Fund (i.e. proxy for aggregate bond market).[2] Based on previous studies (Ferson and Schadt, 1996), I estimate the sentiment exposure coefficient, γ_i, using market condition forecast (MCF) of fund manager. The expression is expressed as

$$\beta_{i,t} = \beta_{m,i} + \gamma_i E(MCF_t | I_t) \tag{3}$$

where I_t is the available information to fund manager and MCF_t is the market condition forecast. The coefficient γ_i measures the fund exposure to equity-market sentiment realized by fund manager. Next, equation (3) is written as equation (4):

[1] For details see Investor sentiment data, 1965-2018 http://people.stern.nyu.edu/jwurgler/
[2] I use the 1-month Treasury bill rate to approximate the risk-free rate.

$$\beta_{i,t} = \beta_{m,i} + \gamma_i^{Sent}(Sent_t - \overline{Sent} + u_t) \quad (4)$$

where $(Sent_t - \overline{Sent} + u_t)$ represents the difference between sentiment and the sample mean of market sentiment in month *t*, and u_t captures the noise which is unknown until *t.* De-meaning of sentiment enables estimation of sentiment exposure coefficient of CBF when the equity-market sentiment is above or below its historical average.

Next, equation (5) is derived from equation (2) by substituting equation (4). Other risk factors besides the bond market factor are added by a function f.

$$R_{i,t} = \alpha_i + \beta_{m,i}R_{m,t} + \gamma_i^{Sent}R_{m,t}(Sent_{m,t} - \overline{Sent}) + \sum_{j=1}^{3}\beta_j f_{j,t} + \nu_{i,t} \quad (5)$$

where $R_{i,t}$ is the month t excess return of CBF *i*, $R_{m,t}$ is the bond market factor. Function f captures additional factors from six-index based model suggested by Blake, Elton and Gruber (1993) for estimating abnormal performance of bond fund. $Sent_{m,t}$ is the market sentiment measure in month *t* and $\overline{Sent}$ is the time-series average of market sentiment estimated from the previous 24 months. γ_i^{Sent} captures exposure of fund *i* to equity-market sentiment, which is estimated from rolling-window time-series regression using past 36 months of data with at least 30-monthly returns.

3.3. Measurement of flow

I follow the standard practice (i.e. Frazzini and Lamont, 2008; Lou, 2012) to estimate net fund flows from monthly change in the total net assets adjusted for net fund return and increase in total net assets due to mergers. Specifically, net flow for fund i in month t is defined as:

$$Flow_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1}(1+R_{i,t}) - MGTNA_{i,t}}{TNA_{i,t-1}}, \quad (6)$$

where $TNA_{i,t}$ and $TNA_{i,t-1}$ refer to the total net asset value at the end of month *t* and *t-1,* respectively. $R_{i,t}$ is the return of fund i and $MGTNA_{i,t}$ is the increase in TNA due to merger during month t. Equation (7) assumes that inflow and outflows happen at the end of the month, and that investors reinvest dividends and other distributions in the fund. As CRSP does not provide the exact merger date, prior studies use the last net asset value (NAV) report date of the target fund to approximate merger date. However, Lou (2012) note that this simple method produces mismatches. I observe substantial increase in total net assets of acquiring fund in the month following the last NAV report date of the target fund. Hence, I designate the succeeding month after last report date of the target fund as the event month. As a standard practice, fund flows are winsorized at the 1% and 99% levels.

3.4. Measurement of performance

I follow the previous studies (i.e. Blake, Elton and Gruber, 1993; Cici and Gibson, 2012; Goldstein, Jiang and Ng, 2017) to measure corporate-bond-fund performance by alpha. Primary performance measure for CBF is four-factor alpha based on the six-index model of Blake, Elton and Gruber (1993), which is estimated from the regression of excess fund returns on four factors: excess aggregate bond market returns, excess aggregate stock market returns, return spread between high-yield bonds and intermediate-term treasury notes, and return spread between GNMA securities and intermediate-term treasury notes. I use the Vanguard Total Bond Market Index Fund return, CRSP value-weighted stock market return, return spread between the Vanguard High-Yield Corporate Fund and the intermediate term treasury note, and the return spread between the Vanguard GNMA Fund and the intermediate term treasury note to estimate the four-factor alpha.

However, I use alpha from Capital Asset Pricing Model (CAPM) as a performance measure in analyzing relation between corporate-bond-fund flow and equity-market sentiment, where performance is a control variable. I use CAPM alpha because Barber, Huang and Odean (2016); Berk and van Binsbergen (2016) find higher explanatory power of CAPM alpha for fund flows compared to multifactor model alpha. I measure variation in the wealth portfolio return by including both bond and stock market returns following Goldstein, Jiang and Ng (2017). I estimate rolling-window time-series regressions using the past 36 months of data to estimate monthly alpha for each fund. Hence, alpha for current month is the excess fund return less sum products of the factor loadings for each fund with the corresponding factor realizations in current month. Data required to construct empirical factors are from the CRSP and the Federal Reserve (FRED). Besides, alpha from four-factor model and CAPM, I use net-of-fee returns, gross returns, and excess returns as alternative measures of fund performance for two reasons. First, my sample includes index funds for which alpha-based performance measure is not relevant. Second, prior literature document very low or insignificant alphas for bond funds (Blake, Elton and Gruber, 1993; Cici and Gibson, 2012).

3.4. Summary statistics

Table 1 Panel A summarizes the characteristics for the sample funds and Panel B summarizes sentiment measures and empirical factors from January 1989 to December 2018, respectively. During my sample period, all CBFs record an average inflow of 1.58% with substantial volatility of 11.1% per month. Sample funds earn net-of-fee returns of 0.376% per month on average. The median fund month-end total net asset is $49.3 million and median fund age is 7.10 years.

On average these CBFs have annual expense of 0.918% and 62.4% of them impose rear-end load. Only 1.03% of funds are index funds and 32.5% of funds are institutional.

Table 1

Summary statistics

This table presents summary statistics for characteristics of corporate-bond funds in Panel A and sentiment measures and empirical factors in Panel B from January 1989 to December 2018. Flow (%) is the monthly net flow in percentage and Fund return (%) is the monthly net-of-fee return in percentage. Log(TNA) and Log(age) are the natural logarithm of total net assets and fund age in years, respectively. Expense (%) is annual percentage of fund expense ratio, Rear load is an indicator variable for a fund that charges back-end load. Index is an indicator variable for a fund that replicates specific index. Institutional is an indicator variable for a fund that belongs to institutional fund category. BW sentiment and HJTZ sentiment are orthogonalized sentiment indexes. Additional variables are the Blake, Elton and Gruber (1993) four factors: R_m is the bond market factor, R_s is the stock market factor, Default is the return spread between high-yield bonds and intermediate-term treasury notes, and Option is the return spread between GNMA securities and intermediate-term treasury notes.

	Mean	25th Percentile	50th Percentile	75th Percentile	Standard deviation	Observations
Panel A: Fund Characteristics						
Flow (%)	1.580	-1.630	-0.154	1.890	11.100	552449
Fund return (%)	0.376	-0.180	0.381	1.040	2.140	556830
Log(TNA)	3.630	2.080	3.900	5.390	2.540	556827
Log(age)	1.790	1.200	1.960	2.560	1.070	556789
Expense (%)	0.914	0.550	0.850	1.280	0.557	556830
Rear load	0.624	0.000	1.000	1.000	0.484	556830
Index	0.010	0.000	0.000	0.000	0.101	556830
Institutional	0.325	0.000	0.000	1.000	0.468	556830
Panel B: Sentiment Measures and Empirical Factors						
BW sentiment	0.193	-0.152	0.083	0.441	0.599	360
HJTZ sentiment	-0.209	-0.621	-0.374	0.025	0.652	360
R_m	0.241	-0.394	0.253	0.923	1.038	360
R_s	0.649	-1.905	1.135	3.350	4.209	360
Default	0.226	-0.535	0.471	1.158	2.017	360
Option	0.144	-0.311	0.172	0.650	0.895	360

The mean and median for the orthogonalized BW sentiment index is 0.193 and 0.083, respectively while the mean and median for the orthogonalized HJTZ sentiment index is -0.209 and -0.374, respectively during 30-year sample period. I also report descriptive statistics on the bond fund risk factors used for measuring risk-adjusted performance of CBFs. Monthly average excess return on the aggregate bond market is 0.241%, which is 2.62 times lower than that of return on the aggregate stock market. However, additional return on stock market comes with the 4.2 times higher volatility than bond market volatility. Monthly risk premium and volatility for Default factor is greater than that of Option factor.

The BW sentiment index has standard deviation of 0.599 per month, reflecting substantial variation of sentiment over the sample period. It highlights the significance of taking equity-market sentiment movement under consideration before making investment decision. Panel A and Panel B of Figure 4 show the BW Sentiment Index and demeaned BW Sentiment Index, respectively, for the sample period. Index is demeaned by taking index value over the previous 24-month time-series average. Similar trend and magnitude of upward and downward movement of both sentiment measures can be observed over time.

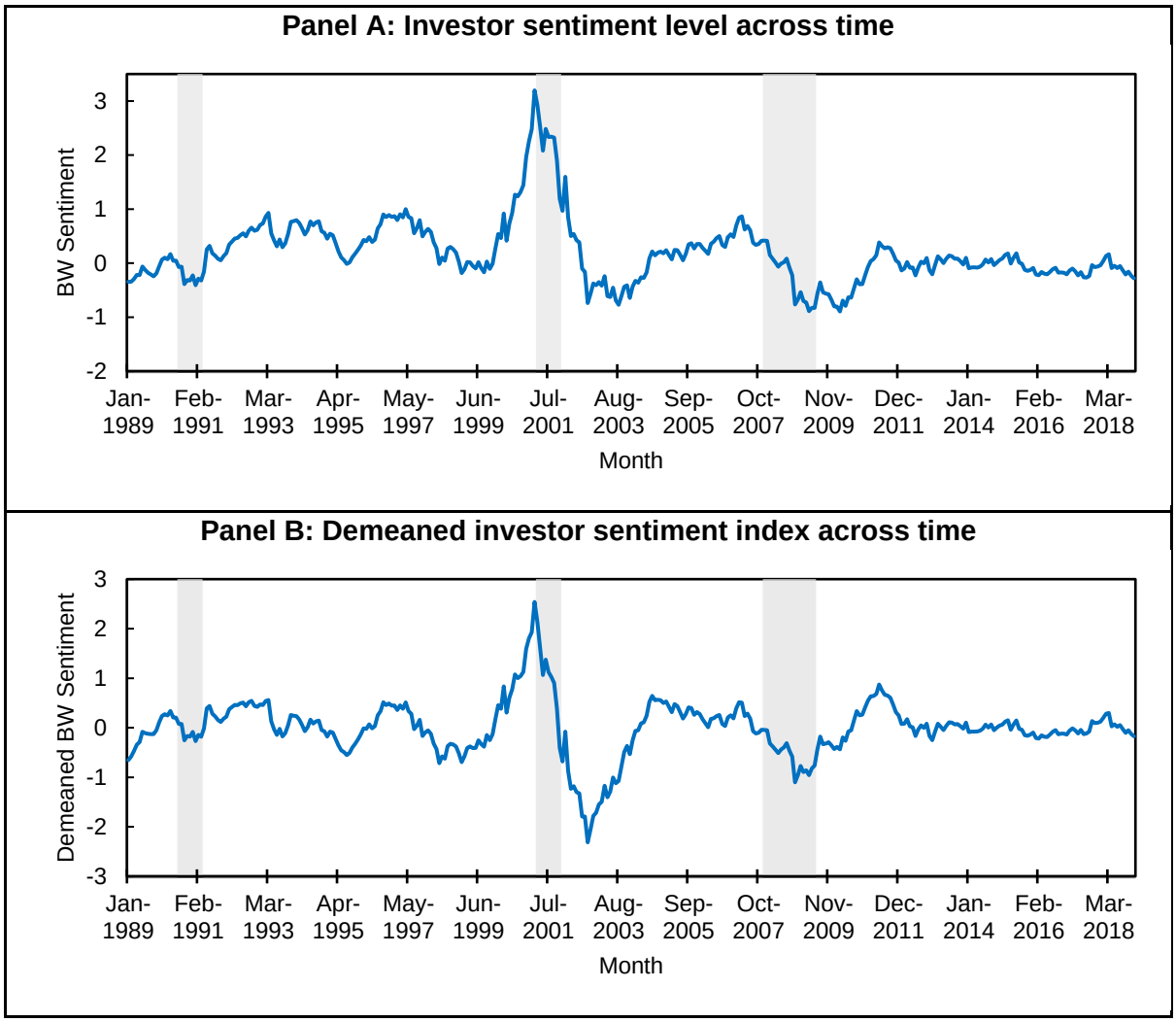

Figure 4. The investor sentiment index, January 1989 to December 2018. The blue line depicts the BW sentiment index developed by Baker and Wurgler (2006). Panel A and Panel B show the index level and the demeaned index level for BW sentiment. Index is demeaned by taking index value over the past 24-month time-series average. The vertical bars represent NBER-declared recessions.

Particularly, sentiment measures rose to a peak in February 2001, which was followed by the fall of sentiment from March 2001 to September 2002. Moreover, sentiment measures were negative from July 2002 to March 2004. Sentiment fell sharply to a trough during the subprime crisis in 2008-09 and it was negative from May 2008 to July 2010. However, variation in investor sentiment in stock market was relatively lower from 2012 to 2018. As the magnitude of variation in equity-market sentiment is considerable, it is likely that the exposure to equity-

market sentiment has effect on CBF flows and performance. Out of the 360 sample months, 37 months fall in NBER-declared recessions and 144 months fall in negative-sentiment periods which suggests that sentiment captures the optimism and pessimism in equity market instead of business cycle.

4. Results

4.1. Equity-market sentiment and corporate-bond-fund flows

In this section, I show that corporate-bond-fund flows respond negatively to the investor sentiment in the equity market. Besides, outperforming funds attract more inflows when equity-market sentiment drops. To test Hypothesis 1a and 1b, I perform the following regression of fund flows on contemporaneous sentiment in the equity market:

$$Flow_{i,t} = \alpha + \beta_1 Sentiment_t + \beta_2 Sentiment_t \times I(Alpha_{i,t\to12\to t\to1} > 0) + I(Alpha_{i,t\to12\to t\to1} > 0) + \delta Controls_{i,t} + U_{i,t} \quad (7)$$

where $Flow_{i,t}$ is net flow of fund *i* in month *t*, $Sentiment_t$ captures equity-market sentiment in month *t* estimated as the BW Sentiment Index over the sample mean. $I(Alpha_{i,t\to12\to t\to1} > 0)$ is an indicator variable equals one if the fund generates a positive alpha in the previous year, and zero otherwise. I include an interaction term between sentiment and the alpha to test how investors respond to outperforming CBF when equity-market sentiment fluctuates. $Controls_{i,t}$ includes the variables which have impact on investor fund choices : $Flow_{i,t-1}$ (fund's net flow in previous month), Log(TNA) (the natural logarithm of fund's net assets), Log(age) (the natural logarithm of fund age in years), Expense (fund's expense ratio), and Rear load (an indicator variable for a fund that charges back-end load). I cluster standard errors by fund share class.

Table 2 presents the results. I show that contemporaneous flows of CBFs are sensitive to the current sentiment in the equity market. The slope coefficient for equity-market sentiment measure is negative and statistically significant with t-statistics of -4.17 and -2.35 for active and index funds, respectively. It implies that declining sentiment in equity market drives inflows into the CBFs. In terms of economic magnitude, a one-standard-deviation decrease in equity-market sentiment in a month is associated with an increase in inflows into an active CBF by 0.1% in the same month. However, a one-standard-deviation decrease in equity-market sentiment in a month correspond to increase in a passive CBF inflow by 0.4% during the same month. It suggests that investors tend to shift their investments to corporate-bond funds when

negative sentiment develops in equity market which reflects the flight to safety phenomenon (Ederington and Golubeva, 2012; Da, Engelberg and Gao, 2015).

Table 2

Response of corporate-bond-fund flows to equity-market sentiment

This table reports the sensitivity of corporate-bond-fund flows to equity-market sentiment. Column 1 and Column 2 present the results for active and index corporate-bond funds, respectively. Flow is the net capital flow in each month. $Sentiment_t$ is measured by taking the BW Sentiment Index over the sample mean. $Alpha_{i,t\to12\to t\to1} > 0$ is an indicator variable equals one if the fund generates a positive alpha in the previous year, and zero otherwise. $Flow_{i,t-1}$ is fund's net capital flow in previous month. $Log(TNA)_{i,t}$ and $Log(age)_{i,t}$ are natural logarithm of fund's total net assets and age in years, respectively. $Expense_{i,t}$ is fund expense ratio and $Rear_{i,t}$ is an indicator variable for a fund that charges back-end load. Standard errors are clustered by fund share class. *, **, and *** indicate statistical significance at 10%, 5% and 1% level, respectively.

	(1) Active funds	(2) Index funds
$Sentiment_t$	-0.001***	-0.004**
	(-4.17)	(-2.35)
$Sentiment_t \times (Alpha_{i,t\to12\to t\to1} > 0)$	-0.006***	-0.002
	(-8.87)	(-0.78)
$Alpha_{i,t\to12\to t\to1} > 0$	0.008***	0.006**
	(22.56)	(2.01)
$Flow_{i,t-1}$	0.152***	0.163***
	(21.83)	(3.90)
$Log(TNA)_{i,t}$	0.001***	0.002***
	(8.43)	(3.12)
$Log(age)_{i,t}$	-0.013***	-0.014***
	(-32.74)	(-4.60)
$Expense_{i,t}$	-0.315***	1.299
	(-6.21)	(1.59)
$Rear_{i,t}$	-0.003***	-0.003
	(-4.45)	(-0.52)
Observations	425,746	4,117
Adjusted R-squared	0.0432	0.0476

As coefficient for sentiment is greater for index funds than active funds, investors exhibit preference for passive funds when sentiment changes. As prior literature provide evidence that benefits from active investment in corporate-bond market outweigh the costs, investors appear to select passive funds (Cici and Gibson, 2012). In contrast, if equity-market sentiment rises in a month, CBFs experience outflows in the same month. As investors become less risk averse when equity-market sentiment strengthens, they tend to switch from bond funds to equity funds. Thus, flows move into CBFs when equity-market sentiment weakens, and flows move out of the CBFs when equity-market sentiment strengthens.

The negative coefficient of interaction term indicates that outperforming CBFs are more likely to attract inflows compared to underperforming CBFs in response to falling sentiment in the equity market. For active funds, the slope coefficient for sentiment interacted with alpha is -0.006 with significant t-statistics of -8.87. Precisely, the sensitivity of flows to sentiment for positive alpha is -0.007 (=-0.001-0.0.006). Therefore, for active CBFs with positive past performance, a one-standard-deviation decrease in equity-market sentiment produces inflows of 0.7%. This finding is consistent with prior literature on flows in mutual funds (Sirri and Tufano, 1998). Statistically insignificant interaction coefficient in case of index funds suggests that sentiment does not influence the flow-performance relations for passive funds.

Results on different subsamples, presented in Table A.1, show that the negative relation between equity-market sentiment and CBF flows is pervasive across retail funds, young funds, and old funds, and present in bear bond market. Retail and institutional funds correspond to fund ownership by retail and institutional investors, respectively. Young and old funds are categorized by median age. Bull and bear market periods are separated by median aggregate bond market excess return. However, the sensitivity of flows to equity-market sentiment is statistically weak for institutional funds and in bull bond market. These findings are consistent with existing literature. Consistent with Hypothesis 1a and 1b, the evidence highlights the effect of equity-market sentiment on investment decisions of corporate-bond-fund investors.

4.2. Sentiment exposure and fund flows

Building on the previous results, I now examine whether the fund flows are sensitive to the equity-market sentiment exposure of corporate-bond funds. According to Hypothesis 2, CBF flows has negative relation with their exposure to equity-market sentiment. To test this hypothesis, I perform the following regression:

$$Flow_{i,t} = \alpha + \beta_1 \gamma_{i,t}^{Sent} + \beta_2 \gamma_{i,t}^{Sent} \times I(\gamma_{i,t}^{Sent} < 0) + \beta_3 I(\gamma_{i,t}^{Sent} < 0) + \delta Controls_{i,t} + U_{i,t} \quad (8)$$

where $Flow_{i,t}$ is net flow of fund *i* in month *t*, $\gamma_{i,t}^{Sent}$ is fund *i's* equity-market sentiment exposure in month *t,* estimated as the coefficient for sentiment measure from a regression of excess fund returns on bond fund performance factors and sentiment measure as of Equation (5). $I(\gamma_{i,t}^{Sent} < 0)$ is an indicator variable equals one if the fund has negative exposure to equity-market sentiment in the current month and zero otherwise. $Controls_{i,t}$ includes $Alpha_{i,t\to 12\to t\to 1}$ (fund's average monthly alpha in the past one year) and the other factors used as in Equation (7). Month fixed-effect is included to control for the aggregate flows in the corporate-bond fund market and standard errors are clustered by funds.

Table 3 offers the results, which indicate that flows into and out of corporate-bond funds are sensitive to their exposure to equity-market sentiment. For active funds, the slope coefficient for equity-market sentiment exposure is -0.003 with t-statistics of -7.61. For a positive-sentiment-exposure fund, a one-standard-deviation increase in equity-market sentiment exposure reduces fund inflows by 0.3%. It appears that investors tend to avoid the CBFs with positive sentiment exposure. However, the slope coefficient for sentiment exposure interacted with the negative sentiment exposure dummy is 0.005 and is statistically significant.

Table 3

Sentiment exposure and fund flows of corporate-bond funds

This table presents the relation between equity-market sentiment exposure and flows of corporate-bond funds. Column 1 and Column 2 present the results for active- and index corporate-bond funds, respectively. Flow is the net capital flow in a given month, $\gamma_{i,t}^{Sent}$ measures fund exposure to equity-market sentiment estimated as the coefficient for sentiment measure from regression of excess fund returns on bond fund performance factors and sentiment measure. $Alpha_{i,t\to12\to t\to1}$ is fund's average monthly alpha in the past one year and other variables are defined as in Table 2. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1) Active funds	(2) Index funds
$\gamma_{i,t}^{Sent}$	-0.003***	-0.010**
	(-7.61)	(-2.55)
$\gamma_{i,t}^{Sent} \times (\gamma_{i,t}^{Sent} < 0)$	0.005***	-0.004
	(6.20)	(-0.28)
$\gamma_{i,t}^{Sent} < 0$	0.002***	-0.001
	(3.65)	(-0.31)
$Alpha_{i,t\to12\to t\to1}$	0.456***	0.983*
	(3.30)	(1.81)
$Flow_{i,t-1}$	0.147***	0.167***
	(21.21)	(3.97)
$Log(TNA)_{i,t}$	0.001***	0.002**
	(10.27)	(2.31)
$Log(age)_{i,t}$	-0.013***	-0.016***
	(-28.23)	(-3.32)
$Expense_{i,t}$	-0.317***	1.154
	(-6.10)	(1.45)
$Rear_{i,t}$	-0.003***	-0.002
	(-5.03)	(-0.23)
Observations	425,746	4,117
Adjusted R-squared	0.0510	0.0448

Specifically, the sensitivity of inflows to negative-sentiment-exposure active fund is 0.002 (=-0.003+0.005), which suggests that CBFs attract flows by reducing portfolio exposure to

sentiment risk. Precisely, a one-standard-deviation decrease in equity-market sentiment exposure generates 0.2% incremental inflows to the negative-sentiment-exposure fund.

Like active funds, index CBFs also experience outflows with increase in equity-market sentiment exposure. The sensitivity of outflows to equity-market sentiment exposure is -0.010 with t-statistics of -2.55. It indicates that a one-standard-deviation increase in sentiment exposure is associated with increase in fund outflows of 1%. However, the interaction term between sentiment exposure and negative sentiment exposure is not statistically significant. Therefore, asymmetric response of net flows to the CBF exposure to equity-market sentiment holds for active funds. The results indicate that investors tend to avoid sentiment risk by investing in CBFs with low or negative sentiment exposure. CBFs do not seem to be successful in attracting inflows by taking more sentiment risk. My finding is consistent with the findings of Massa and Yadav (2015) for equity funds that sentiment catering strategy does not generate flows.

Table A.2 shows results on different subsamples to document that negative relation between flows and sentiment exposure of CBF is prevalent across retail, young and old funds, exists in months with low and high aggregate flows (months with lower- and higher than median aggregate flows in CBFs, respectively), and pervasive in periods with low- and high sentiment (months with below- and above-median sentiment, respectively). Moreover, this relation holds with fund fixed effect. However, the relation is insignificant for institutional funds which is consistent with existing studies. These results confirm that the relation between equity-market sentiment exposure and flows of corporate-bond funds is not spurious.

4.3. Sentiment exposure and fund performance

Next, I test Hypothesis 3 by evaluating performance of corporate-bond funds with different levels of equity-market sentiment exposure. I use the performance measures mentioned in Subsection 3.4. For each month during 1993-2018 period, I construct ten decile portfolios based on the CBF's sentiment exposure coefficients using Equation (5). I exclude the months from June 1991 to December 1992 because of inadequate number of CBFs in these months. Portfolio 1-the top portfolio represents the CBFs with the highest negative exposure to equity-market sentiment. In contrast, Portfolio 10-the bottom portfolio represents the CBFs with the highest positive exposure to equity-market sentiment. I estimate the performance of decile portfolios in two approaches.

First, I estimate the monthly net-of-fee returns, gross returns, and excess returns on decile portfolios by taking equal weighted average of the corresponding returns on funds belonging

to the same decile. Besides, CAPM alpha and four-factor alpha for decile portfolios are estimated by regressing portfolio excess returns on the corresponding factors. Table 4 shows the decile portfolio performance. Average performance appears to decrease with the increase in CBF exposure to equity-market sentiment. Except few exceptions, performance metrics decline monotonically from Portfolio 1 to Portfolio 10. The rightmost column shows the performance difference between low-sentiment-exposure CBFs and high-sentiment-exposure CBFs. CBFs with the highest negative sentiment exposure outperform CBFs with the highest positive exposure by around 0.167% per month (2.023% per year) in terms of net-of-fee return, 0.191% per month (2.316% per year) in terms of gross return, 0.192% per month (2.328% per year) in terms of excess return, 0.22% per month (2.672% per year) in terms of CAPM alpha, and 0.187% per month (2.267% per year) in terms of four-factor alpha. Performance differences between low-sentiment-exposure funds and high-sentiment-exposure funds are robust across performance metrics.

Second, I hold the decile portfolios for 3, 6, 9, 12, 15, 18, or 21-month periods and estimate the cumulative average performance for holding periods. I rebalance the portfolio in each month for the deceased funds. Table 5 Panel A and Panel B present the portfolio four-factor alphas and excess returns, respectively. Alphas and excess returns for Portfolio 1 are greater than Portfolio 10 across different holding periods. The rightmost column represents the return difference between Portfolio 1 and Portfolio 10 for respective holding periods. The differences are significant across all horizons, indicating that high exposure to equity-market sentiment predicts low subsequent fund performance. For holding period of twelve months, Portfolio 1 records alpha of 0.062% per month (0.747% per year) with t-statistics of 1.12. In contrast, Portfolio 10 generates alpha of -0.124% per month (-1.498% per year) with t-statistics of -2.09, for the same holding period, which is 2.245% lower compared to the highest negative-sentiment-exposure fund per year. The effect of sentiment exposure on corporate-bond-fund performance is sizeable as the difference in alphas between Portfolio 1 - the highest negative-sentiment-exposure funds, and Portfolio 10 - the highest positive-sentiment-exposure funds ranges from approximately 0.183% to 0.208% per month (2.22% to 2.52% per year). However, alphas for most of these portfolios are relatively small in magnitude and consequently insignificant which is consistent with findings of prior studies (Chen, Ferson and Peters, 2010; Cici and Gibson, 2012) that bond funds fail to outperform benchmarks. Hence, I estimate the portfolio performance based on excess returns additionally.

Table 5 Panel B shows that the Portfolio 1 earns excess returns of 0.29% per month (3.536% per year) with t-statistics of 2.45 while the Portfolio 10 earns excess returns of 0.098% per month (1.182% per year) with t-statistics of 0.63 for holding period of twelve months. Thus,

Portfolio 1 outperforms Portfolio 10 by 2.328% per year. The difference in excess returns between Portfolio 1 and Portfolio 10 ranges from 0.175% to 0.192% per month (2.120% to 2.328% per year) indicating the outperformance of the CBFs with low equity-market sentiment exposure. To prove that the results are not influenced by inclusion of bubble and crisis periods, I repeat the estimation for measuring holding period alphas excluding 1999-2001 and 2007-2009 periods. Moreover, to examine the persistence of performance of sorted portfolios, I reiterate the estimation for two subsample periods: 1993-2005 and 2006-2018 separately. Table A.3 and Table A.4 present the results which indicate that the spreads between performance of low-sentiment-exposure CBFs and high-sentiment-exposure CBFs hold in periods excluding bubble/crisis episodes and in two subsample periods. Performance difference is slightly insignificant for shorter horizons during 1993-2005 period.

There is economic significance for the results because it suggests that corporate-bond-fund managers who reduce sentiment exposure, when equity-market sentiment is high, outperform the managers who enhance sentiment exposure at the same time. Moreover, the superior performance of negative-sentiment-exposure funds indicates that high exposure to sentiment risk does not compensate funds. Interestingly, as investors send flows to low-sentiment-exposure funds and these funds outperform, they can identify the skilled managers (Gruber, 1996; Zheng, 1999). The superior performance of low-sentiment-exposure CBFs can be attributed to their holdings of bonds with higher ratings, which are less susceptible to subjective valuation, ability to avoid flow-induced trading, and prudential strategies to manage flows. The underperformance of high-sentiment-exposure funds can be attributed to the flow-induced-trading triggered by outflows from these funds.

4.4. Alternative sentiment measures

I use the HJTZ sentiment index (Huang *et al.*, 2015) and the Net Exchanges (NEIO) of equity funds proposed by Ben-Rephael, Kandel and Wohl (2012) as alternative sentiment indexes to check the robustness of results. The results based on HJTZ sentiment index and NEIO are presented in Appendix B and C, respectively which show almost similar findings with few exceptions. The response of flows to equity-market sentiment and equity market sentiment exposure appears to hold for active funds. Furthermore, the outperformance of low-sentiment-exposure CBFs over high-sentiment-exposure funds is prevalent.

Table 4

Average performance of portfolios formed on corporate-bond-fund exposure to equity-market sentiment

This table shows the average performance of portfolios in percentage per month (with Newey-West t-statistics in parenthesis). For every month, 10 portfolios are constructed based on the sentiment exposure coefficients. The rightmost column reflects the performance difference between Portfolio 1 and Portfolio 10.

	Portfolio 1 (Top)	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10 (Bottom)	Difference
Net-of-fee return	0.465	0.455	0.426	0.417	0.404	0.401	0.372	0.340	0.311	0.298	0.167
											(2.76)
Gross return	0.573	0.534	0.495	0.489	0.471	0.473	0.458	0.430	0.385	0.382	0.191
											(3.40)
Excess return	0.290	0.255	0.219	0.215	0.198	0.201	0.184	0.154	0.108	0.098	0.192
											(3.40)
CAPM alpha	0.026	0.019	-0.007	0.000	-0.004	-0.005	-0.033	-0.099	-0.141	-0.194	0.220
											(3.66)
Four-factor alpha	0.062	0.053	0.011	0.019	0.018	0.019	-0.012	-0.057	-0.068	-0.125	0.187
											(3.02)

Table 5

Performance of portfolios formed on corporate-bond-fund exposure to equity-market sentiment: out-of-sample evidence.

This table shows the alphas and excess returns in percentage per month (with Newey-West t-statistics in parenthesis) for sorted portfolios in Panel A and Panel B, respectively. For each month during 1993-2018 period, 10 portfolios are constructed based on the equity-market sentiment exposure coefficients of corporate-bond funds. Decile portfolios are then held for different holding periods. The rightmost column reflects the returns difference between Portfolio 1 and Portfolio 10.

Panel A: Four-factor alphas

	Portfolio 1 (Top)	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10 (Bottom)	Difference
Holding	0.062	0.052	0.011	0.018	0.017	0.017	-0.012	-0.057	-0.067	-0.123	0.185
period = 3	(1.44)	(2.02)	(0.49)	(0.81)	(0.80)	(0.52)	(-0.41)	(-1.75)	(-1.71)	(-2.65)	(3.19)
Holding	0.062	0.050	0.009	0.017	0.015	0.015	-0.011	-0.058	-0.067	-0.120	0.183
period = 6	(1.31)	(1.71)	(0.38)	(0.64)	(0.60)	(0.39)	(-0.32)	(-1.39)	(-1.52)	(-2.23)	(3.27)
Holding	0.064	0.055	0.012	0.018	0.017	0.017	-0.014	-0.057	-0.068	-0.124	0.188
period = 9	(1.33)	(1.97)	(0.50)	(0.77)	(0.83)	(0.52)	(-0.59)	(-1.88)	(-1.88)	(-2.63)	(3.43)
Holding	0.062	0.052	0.010	0.017	0.016	0.017	-0.014	-0.058	-0.068	-0.124	0.185
period = 12	(1.12)	(1.58)	(0.34)	(0.51)	(0.50)	(0.38)	(-0.34)	(-1.17)	(-1.46)	(-2.09)	(3.33)
Holding	0.091	0.081	0.021	0.020	0.021	0.015	-0.019	-0.057	-0.062	-0.116	0.208
period = 15	(1.57)	(1.80)	(0.86)	(0.73)	(0.85)	(0.45)	(-0.73)	(-1.89)	(-1.84)	(-2.25)	(3.40)
Holding	0.070	0.059	0.012	0.014	0.014	0.011	-0.020	-0.059	-0.068	-0.122	0.191
period = 18	(1.35)	(2.10)	(0.45)	(0.64)	(0.65)	(0.33)	(-0.78)	(-1.99)	(-2.18)	(-2.53)	(5.57)
Holding	0.066	0.055	0.012	0.017	0.016	0.016	-0.013	-0.056	-0.067	-0.122	0.187
period = 21	(1.36)	(1.65)	(0.39)	(0.43)	(0.44)	(0.36)	(-0.28)	(-1.01)	(-1.42)	(-1.90)	(3.74)

Panel B: Excess Returns											
	Portfolio 1 (Top)	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10 (Bottom)	Difference
Holding	0.290	0.255	0.219	0.215	0.198	0.201	0.184	0.154	0.108	0.098	0.192
period = 3	(3.59)	(4.16)	(3.81)	(3.76)	(3.47)	(3.00)	(2.76)	(2.06)	(1.30)	(0.94)	(3.13)
Holding	0.290	0.255	0.219	0.215	0.198	0.201	0.184	0.154	0.108	0.098	0.192
period = 6	(3.02)	(3.47)	(3.17)	(3.16)	(2.90)	(2.52)	(2.26)	(1.67)	(1.07)	(0.80)	(3.00)
Holding	0.284	0.250	0.215	0.211	0.195	0.197	0.180	0.150	0.104	0.093	0.191
period = 9	(2.97)	(3.47)	(3.28)	(3.21)	(3.03)	(2.76)	(2.54)	(1.84)	(1.20)	(0.81)	(3.27)
Holding	0.290	0.255	0.219	0.215	0.198	0.201	0.184	0.154	0.108	0.098	0.192
period = 12	(2.45)	(2.79)	(2.55)	(2.49)	(2.32)	(2.06)	(1.81)	(1.32)	(0.87)	(0.63)	(2.57)
Holding	0.251	0.226	0.199	0.201	0.184	0.183	0.167	0.138	0.087	0.077	0.175
period = 15	(2.22)	(2.46)	(2.42)	(2.46)	(2.43)	(2.19)	(2.00)	(1.53)	(0.93)	(0.60)	(2.48)
Holding	0.266	0.236	0.204	0.200	0.186	0.186	0.168	0.139	0.093	0.079	0.187
period = 18	(3.03)	(3.53)	(3.14)	(3.17)	(2.78)	(2.53)	(2.38)	(1.63)	(0.99)	(0.67)	(2.94)
Holding	0.336	0.268	0.244	0.258	0.180	0.210	0.235	0.204	0.130	0.160	0.175
period = 21	(2.53)	(2.73)	(2.52)	(2.39)	(1.96)	(1.95)	(1.81)	(1.43)	(0.93)	(0.87)	(2.10)

5. Conclusion

Given the recent evidence that investor sentiment has significant effect on investors' asset allocation decisions and corporate-bond-funds' holdings has grown substantially, this study examines how wave of equity-market sentiment influences investments in CBFs. By using data on US corporate-bond funds from 1989-2018, I show evidence that low equity-market sentiment influences investors to move into CBFs indicating that investors' risk tolerance decreases when sentiment is not good. Similarly, high sentiment in equity market causes CBF outflows suggesting higher risk tolerance of investors. Moreover, flow-performance relation holds given the fluctuation of equity-market sentiment. In addition, I also show that active CBFs with negative or low exposure to sentiment generates inflows while CBFs with positive or high exposure to sentiment experience outflows indicating the avoidance of sentiment risk by investors.

Subsequently, I examine the performance of CBFs with varying level of exposure to equity-market sentiment by forming portfolios based on their sentiment exposure. I document that low-sentiment-exposure funds outperform high-sentiment-exposure funds across different performance metrics. Besides, I track the performance of CBFs with varying sentiment exposure level which reflects that outperformance of low-sentiment-exposure funds tends to persist for significant period. Specifically, out-of-sample evidence shows that CBFs with the highest negative sentiment exposure outperform CBFs with the highest positive sentiment exposure by 2.22%-2.52% per year. Investors are smart because they direct flows to the corporate-bond funds which outperform, .

The results are robust to different categories of CBFs, different periods, and market-based composite sentiment metrics. My findings highlight the importance of considering the wave of equity-market sentiment by fund managers as it affects flows and performance of funds. Corporate-bond-fund investors should be aware of the fund exposure to equity-market sentiment as it has consequences on the future performance of fund and their wealth as well. Further research is required to disentangle sentiment-induced flows from regular flows and examine its impact on fund performance.

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Appendix A

Table A.1

Response of corporate-bond-fund flows to equity-market sentiment for different subsamples

This table reports the sensitivity of corporate-bond-fund flows to equity-market sentiment for selected subsamples of corporate-bond funds. Flow is the net capital flow in each month. $Sentiment_t$ is measured by taking the BW Sentiment Index over the sample mean. $Alpha_{i,t\to12\to t\to1} > 0$ is an indicator variable equals one if the fund generates a positive alpha in the previous year, and zero otherwise. $Flow_{i,t-1}$ is fund's net capital flow in previous month. $Log(TNA)_{i,t}$ and $Log(age)_{i,t}$ are natural logarithm of fund's total net assets and age in years, respectively. $Expense_{i,t}$ is fund expense ratio and $Rear_{i,t}$ is an indicator variable for a fund that charges back-end load. Standard errors are clustered by fund share class. *, **, and *** indicate statistical significance at 10%, 5% and 1% level, respectively.

	(1) Retail	(2) Institutional	(3) Young	(4) Old	(5) Bear market	(6) Bull market
$Sentiment_t$	-0.002***	0.001	-0.002***	-0.001***	-0.003***	-0.001
	(-6.07)	(1.43)	(-2.98)	(-3.66)	(-5.89)	(-1.49)
$Sentiment_t \times (Alpha_{i,t\to12\to t\to1} > 0)$	-0.006***	-0.006***	-0.007***	-0.005***	-0.004***	-0.006***
	(-7.71)	(-5.09)	(-5.91)	(-7.22)	(-5.09)	(-7.77)
$Alpha_{i,t\to12\to t\to1} > 0$	0.008***	0.009***	0.010***	0.007***	0.007***	0.009***
	(17.87)	(13.36)	(14.94)	(18.93)	(17.17)	(19.55)
$Flow_{i,t-1}$	0.175***	0.122***	0.152***	0.150***	0.145***	0.159***
	(16.60)	(14.44)	(17.23)	(15.97)	(18.58)	(19.97)
$Log(TNA)_{i,t}$	0.001***	0.001***	0.000	0.001***	0.001***	0.001***
	(7.94)	(4.50)	(1.14)	(10.54)	(7.82)	(6.40)
$Log(age)_{i,t}$	-0.012***	-0.013***	-0.019***	-0.008***	-0.013***	-0.013***
	(-26.36)	(-18.36)	(-15.92)	(-14.95)	(-29.45)	(-27.94)
$Expense_{i,t}$	-0.294***	0.240*	-0.043	-0.390***	-0.380***	-0.228***
	(-5.09)	(1.73)	(-0.55)	(-6.52)	(-7.20)	(-3.68)
$Rear_{i,t}$	-0.002***	-0.002*	-0.004***	-0.002***	-0.003***	-0.002***
	(-2.91)	(-1.95)	(-3.90)	(-3.60)	(-4.51)	(-3.50)
Observations	294,067	135,796	162,648	267,215	221,975	207,888
Adjusted R-squared	0.0534	0.0272	0.0334	0.0366	0.0408	0.0453

Table A.2

Sentiment exposure and fund flows of corporate-bond funds for selected subsamples

This table presents the relation between equity-market sentiment exposure and flows of corporate-bond funds for selected subsamples of corporate-bond funds. Flow is the net capital flow in a given month, $\gamma_{i,t}^{Sent}$ measures fund exposure to equity-market sentiment estimated as the coefficient for sentiment measure from regression of excess fund returns on the Blake, Elton and Gruber (1993) four factors and the sentiment measure. $Alpha_{i,t\to12\to t\to1}$ is fund's average monthly alpha in the past one year and other variables are defined as in Table 2. Columns 1 to 6 report results for retail, institutional, young, old, low- and high flows funds, respectively. Columns 7 and 8 report results for low- and high sentiment months – separated by median value of sentiment index. Column 9 and 10 show results with fund fixed-effects. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1) Retail	(2) Institutional	(3) Young	(4) Old	(5) Low flows	(6) High flows	(7) Low sentiment	(8) High sentiment	(9) Fund fixed effects	(10) Fund fixed effects*
$\gamma_{i,t}^{Sent}$	-0.003***	-0.001	-0.004***	-0.001**	-0.003***	-0.003***	-0.002***	-0.002***	-0.003***	-0.003***
	(-8.29)	(-1.42)	(-3.28)	(-2.30)	(-6.56)	(-5.97)	(-3.60)	(-4.67)	(-7.04)	(-7.00)
$\gamma_{i,t}^{Sent} \times (\gamma_{i,t}^{Sent} < 0)$	0.005***	-0.000	0.007***	0.001	0.005***	0.002	0.002*	0.003***	0.004***	0.005***
	(6.74)	(-0.29)	(3.00)	(0.90)	(8.20)	(1.62)	(1.80)	(3.53)	(5.02)	(5.03)
$\gamma_{i,t}^{Sent} < 0$	0.002***	0.001	0.002***	0.001***	0.002***	0.001*	0.002***	0.002***	0.002***	0.002***
	(4.48)	(1.15)	(3.01)	(2.67)	(3.94)	(1.80)	(2.72)	(3.39)	(4.02)	(3.95)
$Alpha_{i,t\to12\to t\to1}$	0.410***	1.132***	0.461**	0.781***	0.427***	0.534***	0.853***	0.280**	0.466***	0.519***
	(3.33)	(5.87)	(2.55)	(7.03)	(3.12)	(3.49)	(7.98)	(2.37)	(3.01)	(2.98)
$Flow_{i,t-1}$	0.165***	0.119***	0.145***	0.144***	0.116***	0.174***	0.167***	0.122***	0.100***	
	(15.83)	(14.26)	(16.56)	(15.55)	(14.50)	(20.26)	(19.79)	(14.85)	(14.20)	
$Log(TNA)_{i,t}$	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.004***	0.005***
	(9.48)	(4.97)	(3.35)	(10.83)	(7.37)	(9.27)	(6.79)	(9.65)	(12.36)	(13.25)
$Log(age)_{i,t}$	-0.011***	-0.014***	-0.021***	-0.007***	-0.011***	-0.014***	-0.013***	-0.012***	-0.032***	-0.035***
	(-21.52)	(-17.91)	(-16.83)	(-12.15)	(-23.73)	(-24.58)	(-25.00)	(-23.14)	(-25.44)	(-25.86)
$Expense_{i,t}$	-0.261***	0.103	-0.052	-0.404***	-0.513***	-0.115*	-0.107	-0.526***	0.587***	0.620***
	(-4.34)	(0.73)	(-0.61)	(-6.57)	(-8.92)	(-1.78)	(-1.64)	(-9.20)	(5.79)	(5.56)
$Rear_{i,t}$	-0.004***	-0.000	-0.004***	-0.003***	-0.004***	-0.003***	-0.002**	-0.005***	0.008**	0.007*
	(-5.02)	(-0.22)	(-3.44)	(-4.57)	(-4.98)	(-3.31)	(-2.45)	(-6.24)	(1.98)	(1.66)
Observations	294,067	135,796	163,182	266,681	227,272	202,591	221,024	208,839	429,863	429,864
Adjusted R^2	0.0660	0.0322	0.0423	0.0457	0.0337	0.0601	0.0585	0.0422	0.0822	0.0729

*I skip lagged flow in Column 10 to control the correlation between lagged flow and residual in a fund-share class fixed effect model. The results in both columns do not vary for this specification.

Table A.3

Performance of the portfolios formed on corporate-bond-fund exposure to equity-market sentiment: out-of-sample evidence, excluding financial bubble/crisis periods

This table shows the four-factor alphas for portfolios formed on corporate-bond-fund exposure to equity-market sentiment. For each month during 1993-2018 period (excluding 1999-2001 and 2007-2009 financial bubble/crisis periods), 10 portfolios are constructed based on the equity-market sentiment exposure coefficients of corporate-bond funds. Decile portfolios are then held for different holding periods. The rightmost column reflects the alpha difference between Portfolio 1 and Portfolio 10. Both excess returns and alphas are reported in percentage per month and the value in the parenthesis indicate Newey-West t-statistics.

	Portfolio 1 Top	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10 Bottom	Difference
Holding	0.100	0.068	0.036	0.022	0.028	0.024	-0.004	-0.044	-0.054	-0.078	0.178
period = 3	(2.37)	(2.46)	(1.78)	(1.45)	(1.86)	(0.72)	(-0.28)	(-2.02)	(-1.45)	(-1.84)	(3.04)
Holding	0.100	0.065	0.034	0.021	0.026	0.021	-0.003	-0.045	-0.054	-0.075	0.175
period = 6	(2.37)	(2.13)	(1.59)	(1.16)	(1.47)	(0.57)	(-0.20)	(-1.84)	(-1.41)	(-1.71)	(3.44)
Holding	0.105	0.073	0.038	0.027	0.034	0.033	0.002	-0.032	-0.042	-0.072	0.177
period = 9	(2.11)	(2.17)	(1.55)	(1.36)	(1.71)	(0.87)	(0.08)	(-1.09)	(-1.03)	(-1.71)	(3.19)
Holding	0.099	0.068	0.035	0.021	0.026	0.023	-0.007	-0.045	-0.056	-0.079	0.178
period = 12	(1.89)	(1.96)	(1.55)	(1.14)	(1.37)	(0.62)	(-0.36)	(-1.77)	(-1.42)	(-1.86)	(3.46)
Holding	0.081	0.074	0.025	0.015	0.023	0.002	-0.015	-0.053	-0.043	-0.082	0.164
period = 15	(0.99)	(1.29)	(0.80)	(0.78)	(1.09)	(0.05)	(-0.80)	(-2.30)	(-1.28)	(-2.40)	(2.50)
Holding	0.099	0.066	0.024	0.011	0.021	0.017	-0.010	-0.042	-0.047	-0.074	0.173
period = 18	(2.05)	(1.85)	(0.84)	(0.48)	(0.93)	(0.49)	(-0.46)	(-1.68)	(-1.41)	(-2.09)	(4.35)
Holding	0.088	0.055	0.044	0.033	0.041	0.022	0.003	-0.065	-0.110	-0.148	0.235
period = 21	(1.42)	(1.41)	(1.99)	(1.42)	(1.67)	(0.59)	(0.12)	(-1.22)	(-1.13)	(-1.39)	(3.09)

Table A.4

Performance of the portfolios formed on corporate-bond-fund exposure to equity-market sentiment: out-of-sample evidence, for subperiods

This table shows the four-factor alphas for portfolios formed on corporate-bond-fund exposure to equity-market sentiment for subperiods 1993 to 2005 in Panel A and 2006 to 2018 in Panel B, respectively. For each month during each subperiod, 10 portfolios are constructed based on the equity-market sentiment exposure coefficients of corporate-bond funds. Decile portfolios are then held for different holding periods. The rightmost column reflects the alpha difference between Portfolio 1 and Portfolio 10. Both excess returns and alphas are reported in percentage per month and the value in the parenthesis indicate Newey-West t-statistics.

Panel A: Subperiod (1993-2005)

	Portfolio 1 Top	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10 Bottom	Difference
Holding	0.086	0.008	-0.011	-0.011	0.006	0.030	-0.013	-0.076	-0.098	-0.076	0.162
period = 3	(1.41)	(0.28)	(-0.50)	(-0.66)	(0.32)	(0.57)	(-0.47)	(-2.27)	(-1.62)	(-1.09)	(1.65)
Holding	0.087	0.004	-0.014	-0.013	0.004	0.025	-0.011	-0.077	-0.097	-0.071	0.157
period = 6	(1.26)	(0.13)	(-0.57)	(-0.71)	(0.17)	(0.43)	(-0.45)	(-2.22)	(-1.68)	(-1.02)	(1.68)
Holding	0.095	0.005	-0.015	-0.016	0.003	0.027	-0.019	-0.076	-0.099	-0.081	0.175
period = 9	(1.47)	(0.15)	(-0.57)	(-0.75)	(0.13)	(0.46)	(-0.84)	(-2.10)	(-1.56)	(-1.14)	(2.10)
Holding	0.085	0.010	-0.013	-0.013	0.005	0.028	-0.018	-0.076	-0.100	-0.078	0.162
period = 12	(0.99)	(0.25)	(-0.48)	(-0.56)	(0.15)	(0.47)	(-0.73)	(-2.03)	(-1.63)	(-1.07)	(1.73)
Holding	0.088	0.010	-0.011	-0.013	0.005	0.029	-0.016	-0.075	-0.099	-0.074	0.162
period = 15	(1.25)	(0.25)	(-0.42)	(-0.54)	(0.16)	(0.47)	(-0.78)	(-2.41)	(-1.96)	(-1.33)	(2.65)
Holding	0.087	0.009	-0.016	-0.017	-0.001	0.020	-0.023	-0.079	-0.099	-0.074	0.161
period = 18	(1.26)	(0.23)	(-0.75)	(-0.73)	(-0.03)	(0.34)	(-1.24)	(-2.50)	(-1.96)	(-1.27)	(3.45)
Holding	0.111	0.018	-0.004	-0.012	0.005	0.025	-0.018	-0.069	-0.097	-0.078	0.190
period = 21	(1.53)	(0.45)	(-0.18)	(-0.54)	(0.19)	(0.44)	(-1.03)	(-2.04)	(-2.70)	(-1.83)	(2.28)

Table A.4 (Cont'd)

Performance of the portfolios formed on corporate-bond-fund exposure to equity-market sentiment: out-of-sample evidence, for subperiods

This table shows the four-factor alphas for portfolios formed on corporate-bond-fund exposure to equity-market sentiment for subperiods 1993 to 2005 in Panel A and 2006 to 2018 in Panel B, respectively. For each month during each subperiod, 10 portfolios are constructed based on the equity-market sentiment exposure coefficients of corporate-bond funds. Decile portfolios are then held for different holding periods. The rightmost column reflects the alpha difference between Portfolio 1 and Portfolio 10. Both excess returns and alphas are reported in percentage per month and the value in the parenthesis indicate Newey-West t-statistics.

Panel B: Subperiod (2006-2018)

	Portfolio 1 Top	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10 Bottom	Difference
Holding	0.042	0.088	0.029	0.042	0.025	0.007	-0.011	-0.042	-0.042	-0.162	0.204
period = 3	(0.69)	(2.24)	(0.84)	(1.12)	(0.73)	(0.16)	(-0.23)	(-0.79)	(-0.81)	(-2.59)	(2.95)
Holding	0.042	0.088	0.029	0.042	0.025	0.007	-0.011	-0.042	-0.042	-0.162	0.204
period = 6	(0.63)	(2.00)	(0.70)	(0.93)	(0.57)	(0.13)	(-0.18)	(-0.59)	(-0.64)	(-2.01)	(3.04)
Holding	0.046	0.092	0.032	0.042	0.026	0.006	-0.013	-0.042	-0.040	-0.159	0.205
period = 9	(0.67)	(2.23)	(0.86)	(1.11)	(0.83)	(0.17)	(-0.34)	(-0.93)	(-1.10)	(-2.62)	(2.84)
Holding	0.042	0.088	0.029	0.042	0.025	0.007	-0.011	-0.042	-0.042	-0.162	0.204
period = 12	(0.57)	(1.76)	(0.59)	(0.71)	(0.47)	(0.11)	(-0.15)	(-0.48)	(-0.59)	(-1.77)	(2.99)
Holding	0.083	0.136	0.053	0.054	0.038	0.020	-0.018	-0.041	-0.029	-0.144	0.227
period = 15	(0.97)	(2.08)	(1.46)	(1.23)	(1.09)	(0.51)	(-0.46)	(-0.91)	(-0.69)	(-1.89)	(2.42)
Holding	0.057	0.104	0.040	0.043	0.027	0.004	-0.017	-0.043	-0.037	-0.150	0.207
period = 18	(0.80)	(3.06)	(0.94)	(1.29)	(0.88)	(0.14)	(-0.42)	(-0.96)	(-1.03)	(-2.18)	(4.34)
Holding	0.043	0.085	0.026	0.038	0.022	0.004	-0.012	-0.041	-0.038	-0.154	0.197
period = 21	(0.64)	(1.84)	(0.49)	(0.56)	(0.37)	(0.07)	(-0.14)	(-0.42)	(-0.49)	(-1.43)	(2.98)

Appendix B

Table B.1

Response of corporate-bond-fund flows to equity-market sentiment based on the HJTZ Sentiment Index.

This table reports the sensitivity of corporate-bond-fund flows to equity-market sentiment for selected subsamples of corporate-bond funds. Flow is the net capital flow in each month. $Sentiment_t$ is measured by taking the HJTZ sentiment index over the sample mean. $Alpha_{i,t\to12\to t\to1} > 0$ is an indicator variable equals one if the fund generates a positive alpha in the previous year, and zero otherwise. $Flow_{i,t-1}$ is fund's net capital flow in previous month. $Log(TNA)_{i,t}$ and $Log(age)_{i,t}$ are natural logarithm of fund's total net assets and age in years, respectively. $Expense_{i,t}$ is fund expense ratio and $Rear_{i,t}$ is an indicator variable for a fund that charges back-end load. Standard errors are clustered by fund share class. *, **, and *** indicate statistical significance at 10%, 5% and 1% level, respectively.

	(1) Active	(2) Index	(3) Retail	(4) Institutional	(5) Young	(6) Old	(7) Bear market	(8) Bull market
$Sentiment_t$	-0.004***	-0.003	-0.004***	-0.004***	-0.004***	-0.004***	-0.006***	-0.003***
	(-13.00)	(-1.03)	(-11.82)	(-5.72)	(-7.42)	(-12.08)	(-13.43)	(-5.98)
$Sentiment_t \times (Alpha_{i,t\to12\to t\to1} > 0)$	-0.001	-0.003	-0.002**	0.001	-0.003**	0.001	0.001	-0.003***
	(-1.41)	(-0.55)	(-2.20)	(0.47)	(-2.07)	(0.81)	(1.21)	(-3.19)
$Alpha_{i,t\to12\to t\to1} > 0$	0.008***	0.006*	0.008***	0.009***	0.010***	0.007***	0.007***	0.009***
	(22.14)	(1.86)	(17.49)	(13.15)	(14.53)	(18.73)	(16.02)	(19.65)
$Flow_{i,t-1}$	0.153***	0.164***	0.175***	0.121***	0.152***	0.150***	0.145***	0.160***
	(21.77)	(3.93)	(16.60)	(14.39)	(17.17)	(15.93)	(18.48)	(19.98)
$Log(TNA)_{i,t}$	0.001***	0.002***	0.001***	0.001***	0.000	0.001***	0.001***	0.001***
	(8.17)	(3.13)	(7.67)	(4.44)	(0.89)	(10.38)	(7.61)	(6.21)
$Log(age)_{i,t}$	-0.013***	-0.014***	-0.012***	-0.013***	-0.019***	-0.008***	-0.013***	-0.013***
	(-32.86)	(-4.57)	(-26.39)	(-18.53)	(-15.68)	(-15.16)	(-29.82)	(-27.96)
$Expense_{i,t}$	-0.312***	1.334	-0.286***	0.237*	-0.034	-0.392***	-0.386***	-0.215***
	(-6.14)	(1.62)	(-4.94)	(1.70)	(-0.43)	(-6.55)	(-7.31)	(-3.48)
$Rear_{i,t}$	-0.002***	-0.003	-0.002***	-0.001*	-0.003***	-0.002***	-0.002***	-0.002***
	(-4.04)	(-0.50)	(-2.60)	(-1.66)	(-3.71)	(-3.16)	(-3.66)	(-3.44)
Observations	425,746	4,117	294,067	135,796	162,648	267,215	221,975	207,888
Adjusted R-squared	0.0431	0.0471	0.0530	0.0273	0.0331	0.0366	0.0410	0.0450

Table B.2

Sentiment exposure and fund flows of corporate-bond funds for selected subsamples (Based on the HJTZ Sentiment Index)

This table presents the relation between equity-market sentiment exposure and flows of corporate-bond funds for selected subsamples of corporate-bond funds. Flow is the net capital flow in a given month, $\gamma_{i,t}^{Sent}$ measures fund exposure to equity-market sentiment estimated as the coefficient for sentiment measure from regression of excess fund returns on the Blake, Elton and Gruber (1993) four factors and the sentiment measure. $Alpha_{i,t\to 12\to t\to 1}$ is fund's average monthly alpha in the past one year and other variables are defined as in Table 2. Columns 1 to 6 report results for retail, institutional, young, old, low- and high flows funds, respectively. Columns 7 and 8 report results for low- and high sentiment months – separated by median value of sentiment index. Column 9 and 10 show results with fund fixed-effects. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1) Active	(2) Index	(3) Retail	(4) Institutional	(5) Young	(6) Old	(7) Low flows	(8) High flows	(9) Fund fixed effects	(10) Fund fixed effects
$\gamma_{i,t}^{Sent}$	-0.001***	0.001	-0.001**	0.003**	-0.001	0.001	-0.001**	-0.000***	-0.000**	-0.000**
	(-2.82)	(0.14)	(-2.09)	(2.47)	(-1.45)	(1.29)	(-2.57)	(-3.53)	(-2.40)	(-2.45)
$\gamma_{i,t}^{Sent} \times (\gamma_{i,t}^{Sent} < 0)$	0.002***	-0.001	0.002**	-0.004**	0.002	-0.000	0.002**	0.003*	0.002***	0.002***
	(2.77)	(-0.09)	(2.42)	(-2.30)	(1.58)	(-0.04)	(2.40)	(1.86)	(2.72)	(2.74)
$\gamma_{i,t}^{Sent} < 0$	0.000	-0.006	0.001***	-0.001*	0.001	-0.000	-0.000	0.001	0.001**	0.001***
	(0.80)	(-1.65)	(3.04)	(-1.83)	(1.13)	(-0.30)	(-0.24)	(1.18)	(2.56)	(2.63)
$Alpha_{i,t\to 12\to t\to 1}$	0.446**	0.914*	0.374**	1.147***	0.322	0.815***	0.385**	0.564***	0.452**	0.503**
	(2.36)	(1.85)	(2.11)	(5.92)	(1.59)	(7.36)	(2.20)	(3.03)	(2.25)	(2.24)
$Flow_{i,t-1}$	0.148***	0.168***	0.166***	0.119***	0.146***	0.144***	0.116***	0.174***	0.100***	
	(21.25)	(4.00)	(15.87)	(14.26)	(16.63)	(15.57)	(14.54)	(20.31)	(14.24)	
$Log(TNA)_{i,t}$	0.001***	0.002**	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.004***	0.005***
	(9.99)	(2.12)	(9.21)	(4.94)	(3.09)	(10.64)	(7.13)	(9.10)	(12.42)	(13.33)
$Log(age)_{i,t}$	-0.013***	-0.012***	-0.011***	-0.014***	-0.020***	-0.007***	-0.011***	-0.014***	-0.032***	-0.035***
	(-28.07)	(-2.72)	(-21.37)	(-17.87)	(-16.59)	(-12.14)	(-23.56)	(-24.47)	(-25.36)	(-25.78)
$Expense_{i,t}$	-0.333***	1.138	-0.278***	0.080	-0.083	-0.414***	-0.534***	-0.121*	0.578***	0.611***
	(-6.32)	(1.37)	(-4.60)	(0.57)	(-0.97)	(-6.74)	(-9.16)	(-1.87)	(5.72)	(5.49)
$Rear_{i,t}$	-0.003***	-0.004	-0.004***	-0.000	-0.004***	-0.003***	-0.004***	-0.003***	0.010**	0.010**
	(-4.99)	(-0.60)	(-4.94)	(-0.28)	(-3.40)	(-4.52)	(-4.92)	(-3.26)	(2.52)	(2.21)
Observations	425,746	4,117	294,067	135,796	163,182	266,681	227,272	202,591	429,863	429,864
Adjusted R^2	0.0506	0.0428	0.0653	0.0323	0.0417	0.0456	0.0332	0.0598	0.0818	0.0725

Table B.3
Average performance of the portfolios formed on corporate-bond-fund exposure to equity-market sentiment (Based on the HJTZ Sentiment Index)

This table shows the average performance of portfolios in percentage per month (with Newey-West t-statistics in parenthesis). For every month, 10 portfolios are constructed based on the sentiment exposure coefficients estimated from the previous 36 months. The rightmost column reflects the performance difference between Portfolio 1 and Portfolio 10.

	Portfolio 1 (Top)	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10 (Bottom)	Difference
Net-of-fee return	0.423	0.433	0.381	0.385	0.378	0.353	0.365	0.372	0.346	0.372	0.051 (0.80)
Gross return	0.516	0.507	0.465	0.446	0.462	0.434	0.448	0.465	0.471	0.482	0.035 (0.56)
Excess return	0.237	0.229	0.190	0.173	0.191	0.162	0.175	0.190	0.190	0.194	0.043 (0.70)
CAPM alpha	-0.040	-0.021	-0.031	-0.042	-0.025	-0.069	-0.062	-0.044	-0.050	-0.053	0.013 (0.20)
Four-factor alpha	-0.010	-0.002	-0.013	-0.026	0.001	-0.055	-0.041	-0.003	0.034	0.036	-0.045 (-0.75)

Table B.4

Performance of the portfolios formed on corporate-bond-fund exposure to equity-market sentiment: out-of-sample evidence (Based on the HJTZ Sentiment Index).

This table shows the excess returns for portfolios based on corporate-bond-fund exposure to equity-market sentiment. For each month during 1993-2018 period, 10 portfolios are constructed based on the equity-market sentiment exposure coefficients of corporate-bond funds. Decile portfolios are then held for different holding periods. The rightmost column reflects the returns difference between Portfolio 1 and Portfolio 10. Excess returns are reported in percentage per month and the value in the parenthesis indicate Newey-West t-statistics.

Panel A: Four-factor Alphas

	Portfolio 1 (Top)	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10 (Bottom)	Difference
Holding	0.237	0.229	0.190	0.173	0.191	0.162	0.175	0.190	0.190	0.194	0.043
period = 3	(2.72)	(3.35)	(3.41)	(3.25)	(3.31)	(2.86)	(2.75)	(2.53)	(2.09)	(1.80)	(0.65)
Holding	0.237	0.229	0.190	0.173	0.191	0.162	0.175	0.190	0.190	0.194	0.043
period = 6	(2.29)	(2.73)	(2.80)	(2.69)	(2.79)	(2.33)	(2.28)	(2.12)	(1.76)	(1.54)	(0.57)
Holding	0.231	0.224	0.186	0.170	0.187	0.159	0.172	0.186	0.185	0.186	0.045
period = 9	(2.17)	(2.81)	(2.88)	(2.82)	(2.93)	(2.58)	(2.54)	(2.47)	(1.85)	(1.66)	(0.65)
Holding	0.237	0.229	0.190	0.173	0.191	0.162	0.175	0.190	0.190	0.194	0.043
period = 12	(1.80)	(2.26)	(2.31)	(2.22)	(2.40)	(1.90)	(1.83)	(1.68)	(1.36)	(1.21)	(0.52)
Holding	0.199	0.204	0.173	0.152	0.183	0.154	0.171	0.176	0.169	0.146	0.053
period = 15	(1.67)	(2.05)	(2.21)	(2.15)	(2.36)	(2.25)	(2.22)	(2.14)	(1.46)	(1.01)	(0.70)
Holding	0.215	0.210	0.176	0.160	0.178	0.150	0.163	0.175	0.173	0.165	0.050
period = 18	(2.25)	(2.76)	(2.68)	(2.44)	(2.85)	(2.38)	(2.39)	(2.28)	(1.64)	(1.43)	(0.65)
Holding	0.243	0.288	0.210	0.159	0.247	0.188	0.240	0.216	0.233	0.249	-0.006
period = 21	(1.81)	(2.15)	(2.28)	(1.88)	(2.29)	(1.95)	(1.82)	(1.67)	(1.41)	(1.32)	(-0.05)

Appendix C

Table C.1

Response of corporate-bond-fund flows to equity-market sentiment based on the Net Exchanges (NEIO) of Equity Funds. [1993-2015]

This table reports the sensitivity of corporate-bond-fund flows to equity-market sentiment for selected subsamples of corporate-bond funds. Flow is the net capital flow in each month. $Sentiment_t$ is measured by taking the HJTZ sentiment index over the sample mean. $Alpha_{i,t\to12\to t\to1} > 0$ is an indicator variable equals one if the fund generates a positive alpha in the previous year, and zero otherwise. $Flow_{i,t-1}$ is fund's net capital flow in previous month. $Log(TNA)_{i,t}$ and $Log(age)_{i,t}$ are natural logarithm of fund's total net assets and age in years, respectively. $Expense_{i,t}$ is fund expense ratio and $Rear_{i,t}$ is an indicator variable for a fund that charges back-end load. Standard errors are clustered by fund share class. *, **, and *** indicate statistical significance at 10%, 5% and 1% level, respectively.

	(1) Active	(2) Index	(3) Retail	(4) Institutional	(5) Young	(6) Old	(7) Bear market	(8) Bull market
$Sentiment_t$	-1.986***	2.208	-2.594***	0.054	-3.272***	-0.701***	-1.079***	-2.465***
	(-7.87)	(1.14)	(-8.80)	(0.12)	(-8.18)	(-2.65)	(-3.43)	(-7.77)
$Sentiment_t \times (Alpha_{i,t\to12\to t\to1} > 0)$	-0.565*	-3.763	-0.468	-1.501**	0.468	-1.631***	-0.919**	-0.230
	(-1.67)	(-1.30)	(-1.20)	(-2.35)	(0.82)	(-4.42)	(-1.97)	(-0.52)
$Alpha_{i,t\to12\to t\to1} > 0$	0.010***	0.008**	0.010***	0.009***	0.012***	0.008***	0.008***	0.011***
	(23.11)	(2.19)	(19.34)	(12.29)	(15.70)	(18.81)	(16.91)	(20.89)
$Flow_{i,t-1}$	0.161***	0.113**	0.181***	0.128***	0.159***	0.158***	0.151***	0.169***
	(20.34)	(2.48)	(15.68)	(13.29)	(15.88)	(15.00)	(17.20)	(18.50)
$Log(TNA)_{i,t}$	0.001***	0.002**	0.001***	0.001***	-0.000	0.001***	0.001***	0.001***
	(5.83)	(2.41)	(5.88)	(2.89)	(-0.08)	(8.07)	(5.81)	(4.04)
$Log(age)_{i,t}$	-0.012***	-0.012***	-0.012***	-0.013***	-0.018***	-0.007***	-0.012***	-0.012***
	(-27.69)	(-3.15)	(-22.88)	(-15.18)	(-14.06)	(-12.11)	(-25.41)	(-23.19)
$Expense_{i,t}$	-0.283***	0.530	-0.291***	0.463***	0.005	-0.403***	-0.331***	-0.236***
	(-5.19)	(0.71)	(-4.78)	(2.77)	(0.06)	(-6.31)	(-5.74)	(-3.61)
$Rear_{i,t}$	-0.003***	-0.003	-0.003***	-0.002**	-0.004***	-0.003***	-0.003***	-0.003***
	(-5.21)	(-0.57)	(-3.60)	(-2.41)	(-4.32)	(-4.09)	(-4.84)	(-4.35)
Observations	350,194	3,167	248,615	104,746	140,864	212,497	181,499	171,862
Adjusted R-squared	0.0444	0.0261	0.0540	0.0285	0.0359	0.0382	0.0403	0.0478

Table C.2

Sentiment exposure and fund flows of corporate-bond funds for selected subsamples (Based on the Net Exchanges (NEIO) of Equity Funds) [1993-2015]

This table presents the relation between equity-market sentiment exposure and flows of corporate-bond funds for selected subsamples of corporate-bond funds. Flow is the net capital flow in a given month, $\gamma_{i,t}^{Sent}$ measures fund exposure to equity-market sentiment estimated as the coefficient for sentiment measure from regression of excess fund returns on the Blake, Elton and Gruber (1993) four factors and the sentiment measure. $Alpha_{i,t\to12\to t\to1}$ is fund's average monthly alpha in the past one year and other variables are defined as in Table 2. Columns 1 to 6 report results for retail, institutional, young, old, low- and high flows funds, respectively. Columns 7 and 8 report results for low- and high sentiment months – separated by median value of sentiment index. Column 9 and 10 show results with fund fixed-effects. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1) Active	(2) Index	(3) Retail	(4) Institutional	(5) Young	(6) Old	(7) Low flows	(8) High flows	(9) Fund fixed effects	(10) Fund fixed effects
$\gamma_{i,t}^{Sent}$	-0.000**	0.000	-0.000	0.000	-0.000	0.000	-0.000**	-0.000*	-0.000	-0.000
	(-1.98)	(1.00)	(-1.63)	(0.02)	(-1.24)	(0.15)	(-2.51)	(-1.71)	(-1.49)	(-1.48)
$\gamma_{i,t}^{Sent} \times (\gamma_{i,t}^{Sent} < 0)$	0.000**	-0.000	0.000**	0.000	0.000*	0.000	0.000**	0.000**	0.000**	0.000*
	(2.49)	(-0.91)	(2.47)	(0.15)	(1.71)	(0.78)	(2.37)	(2.50)	(1.96)	(1.94)
$\gamma_{i,t}^{Sent} < 0$	0.001*	0.003	0.002***	-0.001	0.001	0.001*	-0.000	0.002**	0.001***	0.001***
	(1.90)	(0.62)	(3.79)	(-1.58)	(1.24)	(1.84)	(-0.26)	(2.58)	(2.64)	(2.71)
$Alpha_{i,t\to12\to t\to1}$	0.409**	1.353***	0.351**	1.069***	0.289	0.779***	0.320**	0.580***	0.415**	0.462**
	(2.18)	(3.63)	(1.96)	(5.96)	(1.53)	(7.32)	(1.98)	(2.80)	(2.14)	(2.12)
$Flow_{i,t-1}$	0.155***	0.112**	0.170***	0.126***	0.152***	0.151***	0.119***	0.181***	0.103***	
	(19.73)	(2.48)	(14.87)	(13.20)	(15.26)	(14.57)	(13.20)	(18.84)	(12.90)	
$Log(TNA)_{i,t}$	0.001***	0.002**	0.001***	0.001***	0.000**	0.001***	0.001***	0.001***	0.004***	0.005***
	(7.86)	(2.08)	(7.88)	(3.42)	(2.13)	(8.68)	(5.36)	(7.12)	(11.59)	(12.53)
$Log(age)_{i,t}$	-0.012***	-0.013***	-0.011***	-0.014***	-0.020***	-0.007***	-0.011***	-0.014***	-0.033***	-0.037***
	(-24.21)	(-3.19)	(-19.24)	(-14.98)	(-14.90)	(-10.65)	(-19.85)	(-21.45)	(-23.39)	(-23.78)
$Expense_{i,t}$	-0.308***	0.120	-0.291***	0.322*	-0.071	-0.424***	-0.551***	-0.084	0.481***	0.507***
	(-5.48)	(0.18)	(-4.62)	(1.91)	(-0.80)	(-6.52)	(-8.68)	(-1.23)	(4.60)	(4.38)
$Rear_{i,t}$	-0.004***	-0.003	-0.005***	-0.000	-0.004***	-0.003***	-0.004***	-0.003***	-0.002	-0.000***
	(-4.98)	(-0.46)	(-4.92)	(-0.41)	(-3.31)	(-3.90)	(-5.13)	(-3.16)	(-0.91)	(-4.10)
Observations	350,194	3,167	248,615	104,746	141,346	212,015	178,324	175,037	353,361	353,362
Adjusted R^2	0.0531	0.0215	0.0671	0.0343	0.0457	0.0482	0.0338	0.0606	0.0868	0.0770

Table C.3

Performance of the portfolios formed on corporate-bond-fund exposure to equity-market sentiment: out-of-sample evidence. (Based on the Net Exchanges (NEIO) of Equity Funds)

This table shows the four-factor alphas for portfolios formed on corporate-bond-fund exposure to equity-market sentiment. For each month during 1993-2015 period, 10 portfolios are constructed based on the equity-market sentiment exposure coefficients of corporate-bond funds. Decile portfolios are then held for different holding periods. The rightmost column reflects the returns difference between Portfolio 1 and Portfolio 10. Alpha is reported in percentage per month and the value in the parenthesis indicate Newey-West t-statistics.

	Portfolio 1 (Top)	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9	Portfolio 10 (Bottom)	Difference
Holding	0.069	0.000	-0.003	-0.001	-0.021	0.008	-0.024	-0.018	-0.062	-0.074	0.143
period = 3	(1.29)	(0.01)	(-0.13)	(-0.02)	(-0.92)	(0.19)	(-0.69)	(-0.51)	(-1.36)	(-1.43)	(2.02)
Holding	0.069	-0.001	-0.005	-0.001	-0.021	0.008	-0.024	-0.019	-0.060	-0.074	0.143
period = 6	(1.08)	(-0.02)	(-0.16)	(-0.02)	(-0.69)	(0.16)	(-0.54)	(-0.49)	(-1.21)	(-1.41)	(2.08)
Holding	0.061	-0.005	-0.006	-0.001	-0.022	0.006	-0.024	-0.018	-0.060	-0.072	0.134
period = 9	(0.90)	(-0.13)	(-0.24)	(-0.07)	(-0.91)	(0.14)	(-0.65)	(-0.56)	(-1.27)	(-1.33)	(1.60)
Holding	0.069	0.001	-0.004	-0.001	-0.024	0.005	-0.026	-0.019	-0.060	-0.073	0.142
period = 12	(0.99)	(0.02)	(-0.11)	(-0.04)	(-0.64)	(0.08)	(-0.51)	(-0.43)	(-1.17)	(-1.23)	(2.18)
Holding	0.066	-0.001	-0.005	-0.001	-0.023	0.007	-0.024	-0.018	-0.059	-0.069	0.134
period = 15	(0.97)	(-0.04)	(-0.19)	(-0.06)	(-1.00)	(0.18)	(-0.83)	(-0.66)	(-1.49)	(-1.39)	(2.23)
Holding	0.038	-0.024	-0.018	-0.004	-0.026	0.001	-0.027	-0.021	-0.053	-0.070	0.108
period = 18	(0.56)	(-0.49)	(-0.60)	(-0.17)	(-0.87)	(0.02)	(-0.59)	(-0.67)	(-1.37)	(-1.36)	(1.40)
Holding	0.069	0.000	-0.004	-0.002	-0.023	0.007	-0.024	-0.018	-0.059	-0.068	0.137
period = 21	(0.79)	(-0.01)	(-0.10)	(-0.04)	(-0.57)	(0.13)	(-0.44)	(-0.38)	(-1.32)	(-1.12)	(2.02)

ID: 1965781

Data sources

1. CRSP Survivor-Bias-Free US Mutual Fund Database is available in https://wrds-www.wharton.upenn.edu/

2. BW sentiment series, HJTZ sentiment series, and NEIO are available in http://people.stern.nyu.edu/jwurgler/ , http://apps.olin.wustl.edu/faculty/zhou/#Publications, and https://sites.google.com/site/abenreph/home/research respectively.

3. Data on treasury securities' yields are available ins https://fred.stlouisfed.org/