Investor Sentiment and the Pricing of Macro Risks for Hedge Funds*

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Abstract

Hedge funds with larger macroeconomic-risk betas do not earn higher returns, contrast to the theoretically predicted risk-return tradeoff. Meanwhile, high macro-beta funds deliver higher returns than low macro-beta funds following low-sentiment months, whereas the risk-return relation is flat following high-sentiment months. Our findings are consistent with the conjecture that standard asset pricing theory is still at work when market participants are rational. On the other hand, sophisticatedly managed portfolios including hedge funds are possibly affected by sentiment-induced mispricing, especially for those with high macro-risk loadings.

JEL Classification: G10, G11, G23
Keywords: Hedge funds, macroeconomic risks, sentiment

1 Introduction

Standard economic theories predict that shocks to macroeconomic variables co-move with time-varying state and thus enter the pricing kernel (e.g., the Intertemporal Capital Asset Pricing Model of Merton (1973)). Theoretically, macroeconomic risk factors should be priced in the cross section of asset returns and earn positive risk premia. Empirically, Shen et al. (2017) find it is not the case: stocks with large macro risk betas earn similar returns as those with small betas, suggesting empirical failure of macro risks in pricing stocks. By contrast, a positive risk-return relation does exist after periods with low investor sentiment when the market is rational. In addition, a negative risk-return relation is observed after high-sentiment months, which is due to high-beta stocks' larger sensitivities to the market-wide overpricing when the marginal investors are irrational.[1] The contrasting risk-return tradeoff observed in pessimistic and optimistic periods indicates the important role of investor sentiment in the pricing of macroeconomic risks.

While the two-regime phenomenon has been documented for macro-risk-return relation among stocks, it is unclear whether hedge funds are also affected by market-wide sentiment and exhibit similar pattern. First, hedge funds are managed portfolios and thus fund managers could dynamically choose their portfolios' loadings on various macro risk factors. As a result, even the underlying individual stocks may suffer from sentiment-driven mispricing, the risk-return relation in hedge fund portfolios does not necessarily need to be distorted. Second, hedge fund managers are commonly viewed as the most sophisticated group of market participants and may be immune from market sentiment, which is usually believed to have stronger impact on irrational retail investors. Third, besides stocks, hedge funds invest in alternative asset classes and adopt sophisticated investment strategies including short selling. Therefore, it is an open question whether macro-risk per se should be priced in the

[1] Antoniou et al. (2016) focus on the risk-return tradeoff of the market factor (CAPM) and find that positive/negative security market line is observed in pessimistic/optimistic sentiment periods.

cross section of hedge fund returns, and if so, what the role of sentiment should play in the risk-return relation of hedge funds.

In this paper, our objective is to answer the question that whether and how investor sentiment affects the pricing of macroeconomic risks for hedge funds. We investigate the relation between funds' macro factor betas and returns in the cross section, and introduce investor sentiment as a state variable to explain funds' risk-return tradeoff. We show that even sophisticatedly managed hedge fund portfolios could be affected by investor sentiment and exhibit distorted risk-return relation in certain sentiment state. Our results add to the long-standing debate on risk-based versus behavioral-based explanations for asset returns.

Following Shen et al. (2017), we consider ten macroeconomic risk factors that have been proposed in the literature that enter the time-varying stochastic discount factor. These ten factors include a consumption risk factor, two production-related factors, two factors derived from bond yields, two inflation factors, a market-wide volatility factor, a stock market factor, and a labor income factor. Hedge fund portfolios are formed according to individual funds' beta loadings on these macro risk factors. We find that, similar to portfolios formed using stocks, hedge fund portfolios do not exhibit positive risk-return relation for those macro risk factors, with an average return spread between the High- and the Low-beta portfolios of 10 bps per month (t-statistics = 0.51).

Using Baker and Wurgler (2006) sentiment index to classify out sample into two low-sentiment and high-sentiment subsamples, we find that the theory-suggested risk-return tradeoff exists only following low-sentiment months. Several forces together contribute to the positive risk-return relation. First, pessimistic investors are out of the market due to short-sell constraints when the market sentiment is low, leaving marginal investors to be rational; second, large risk premium during low sentiment period allows the risk-return relation to be identified with less noise; third, market-wide underpricing is more severe for funds with

high-beta holdings. After high-sentiment months, the risk-return relation is almost flat as sentiment-induced overpricing has a more substantial impact on funds whose holdings have higher macro betas, the effect of which attenuates the common risk-return tradeoff. The two-sentiment-regime return difference for the high- and low-risk fund portfolios is on average -0.82% per month (t-statistics = -2.48).

Our findings hold for all hedge funds, as well as for subsets of funds including equity style hedge funds and non-equity style hedge funds; although the latter deliver results in smaller magnitude. We also find that investor sentiment does not affect fund of funds' (FOF) risk-return tradeoff, which is probably due to the diversified investment nature of FOFs. The Fung-Hsieh eight-factor model adjusted alpha spread between high- and low-beta fund portfolios is reduced to 6 bps after low-sentiment months, providing additional supportive evidence for effective pricing of macro risks among hedge funds during rational market period. Similar two-regime pattern is also observed for mutual fund portfolios sorted by macro factors.

Our results are robust to a battery of alternatives, including other classification methods for hedge fund strategies, alternative sentiment measures, alternative portfolio weighting method, estimating macro-beta while controlling for market factor, controlling the stale price of hedge funds' reported returns, and using portfolios formed at management company level. All pieces of evidence suggest that even for sophisticatedly managed portfolios such as hedge funds, market-wide investor sentiment could still distort funds' macro-risk-return relation through sentiment-induced mispricing on their holdings.

Related literature. A growing strand of literature studies the effect of investor sentiment on institutional investors' investment decision. Complementary to previous papers that focus on retail investors,[2] several recent studies examine whether and how sentiment affects

[2]Papers examine retail investors' sentimental induced behaviors and the consequences include Lee et al. (1991), Neal and Wheatley (1998), Kumar and Lee (2006), Lemmon and Portniaguina (2006), Barber et al. (2008), Ali and Gurun (2009), Barber et al. (2009), Livnat and Petrovits (2009), Schmeling (2009),

professional asset managers. DeVault et al. (2018) find that institutional investors' demand for speculative stocks increase as market-wide sentiment increases, suggesting that institutional investors' sentiment driven behavior is the underlying force for the return-sentiment relation documented in the previous papers. Cornell et al. (2011) also find that institutional investors increase holdings and analysts issue "buy" recommendations for "difficult-to-value" stocks when sentiment is high. In contrast, Gao et al. (2017) find that institutional investors tend to sell stocks when investor sentiment is low, and thus their trades correct mispricing across stocks. Our paper adds to this line of research by showing that hedge funds, which are commonly viewed as the most sophisticated investors, are not immune to sentiment and their macro-risk-return relation could be distorted by sentiment-induced mispricings. In addition, our findings also makes contribution to the burgeoning literature on how institutional investors affect stock market anomalies.[3]

Second, our paper is related to the studies on the cross section of hedge fund returns. Bali et al. (2011, 2012, 2014) find that hedge funds' exposures to some financial market and macroeconomic risk factors, funds' systematic risk levels, and the time-varying macroeconomic uncertainty beta explain the cross sectional hedge funds' return differences.[4] Chen et al. (2016) find that hedge funds with higher sensitivities to the change in investor sentiment earn larger returns and attribute their findings to sentiment risk embedded in arbitrage

Ben-Rephael et al. (2012), Brown et al. (2012), Chung et al. (2012), Hribar and McInnis (2012), Mian and Sankaraguruswamy (2012), Antoniou et al. (2013), Hribar and Quinn (2013), Simpson (2013), Arif and Lee (2014), McLean and Zhao (2014), and Li and Luo (2017).

[3]Akbas et al. (2015) show that mutual fund flows exacerbate cross-sectional mispricing while hedge fund flows attenuate aggregate mispricing. In addition, in contrast to mutual funds that may exacerbate pricing of several anomalies, hedge funds do not exhibit a demand for anomaly-related stock characteristics, suggesting that hedge funds may trade on more complex signals than common mispricing anomalies. Edelen et al. (2016) find that institutions tend to buy overpriced stocks, i.e., the short leg of an anomaly, and result in ex post negative returns.

[4]While Bali et al. (2014) find that hedge funds with larger sensitivities to a comprehensive macroeconomic uncertainty index earn higher returns unconditionally, their finding does not point to a risk-based explanation: first, the fact that high uncertainty beta funds deliver large returns when conditional macroeconomic uncertainty is large suggests that these funds have better management skill; second, time-varying macroeconomic uncertainty is persistent with high autocorrelation coefficient, which is not a risk factor per se as change in volatility.

trades (De Long et al. (1990)). Smith et al. (2016) investigate how hedge funds utilize technical analysis to profit from larger mispricing during high-sentiment periods.[5] Our paper, to the best of our knowledge, is the first that documents how investor sentiment could distort the macro-risk-return relation of hedge funds in the cross section.

Lastly, our paper also makes contributions to the broad literature on sentiment and stock market anomalies. Built on the seminal work of Baker and Wugler (2006, 2007), researchers have examined the impacts of BW sentiment measure on various market anomalies (Stambaugh et al. (2012)), idiosyncratic volatility puzzle (Stambaugh et al. (2015)), forward premium puzzle (Yu (2013)), mean-variance relationship (Yu and Yuan (2011)), international markets (Baker et al. (2012)), and so forth.

The rest of the paper is organized as follows. In Section 2, we describe the data used in the paper. Section 3 presents the main empirical findings. In Section 4, we provide robustness results and additional discussions. Section 5 concludes.

2 Data

This section describes various datasets used in the paper. We report the summary statistics for macroeconomic factors and the hedge fund dataset. In addition, we also describe the construction detail of macro-factor-beta sorted hedge fund portfolios.

2.1 Investor sentiment

We use the Baker-Wurgler (BW) sentiment index (Baker and Wugler (2006)) as our measure for market participants' sentiment level. The monthly BW sentiment index spans from July

[5]Other factors that affect the cross section of hedge fund returns include liquidity (Aragon (2007), Sadka (2010), Teo (2011), Hu et al. (2013), Jylhä et al. (2014), Golez et al. (2018), and Jame (2018)), managers' skill (Jagannathan et al. (2010), Cao et al. (2013), Jiao et al. (2016), Chen et al. (2018), and Gao et al. (2018)), and incentives (Ackermann et al. (2009), Agarwal et al. (2009), Boyson (2010), Brown et al. (2012), Buraschi et al. (2014), Lim et al. (2016), and Yin (2016)).

1965 to December 2017.[6] The BW sentiment index is constructed as the first principal component of five sentiment proxies, all of which have first been standardized and orthogonalized with respect to a set of macroeconomic indicators, including the average closed-end fund discount, the number of IPOs and their average first-day returns, the dividend premium, and the equity share in new issues.

Figure 1 plots the BW index along with the next-month excess returns of Hedge Fund Research Indices (HFRI) from 1997:01 to 2017:12. Note that from the plot, it is likely that the BW index indeed captures the market-wide investor sentiment. For example, the index is high during the Internet bubble period but low during the financial crisis. The correlation between the sentiment index and the next-month excess returns of fund weighted composite index is -0.12, suggesting at the aggregate level there is no clear relation between sentiment level and future hedge fund performance. This pattern of low correlation also exists for other hedge fund strategies, which confirms that on average no specific hedge fund strategy is strongly affected by investor sentiment.[7]

2.2 Hedge fund data

The data on hedge fund monthly returns and characteristics are obtained from the Lipper TASS database, the most commonly used hedge fund databases in the literature (see, e.g., Fung and Hsieh (1997); Liang (2000); Brown, Goetzmann, and Park (2001); Getmansky, Lo, and Makarov (2004); Agarwal, Daniel, and Naik (2009); Bali et al. (2011, 2012, 2014); and Gao et al. (2018)). Our sample starts from 1994:01 when Lipper TASS first started to track graveyard funds and ends in 2017:12. We keep both live and graveyard funds that report net-of-fee returns in USD. Other standard filters include a minimum AUM of $10 million as

[6]The original BW index is from July 1965 to September 2015 and can be downloaded at Jeffrey Wurgler's website: http://people.stern.nyu.edu/jwurgler. We follow their construction procedure closely and extend the index to December 2017. The correlation between the replicated BW index and the original one is 0.97. All our results hold using the original BW index over the sample ending in September 2015.

[7]Figure B.1 in the Appendix shows similar low correlations between BW index and next-month returns of 20 hedge fund sub-strategies.

of the month of portfolio formation (Cao et al. (2013); Hu et al. (2013); Gao et al. (2018)), a minimum of 24 monthly return observations (Smith et al. (2016)), and excluding a fund's return observations that were before the fund was added to the database to alleviate backfill bias (Agarwal and Jorion (2010)). Overall, our final sample consists of 8465 funds over the period of 1997:01 to 2017:12, of which 4632 funds are graveyard.

Panel A of Table 1 presents the summary statistics of hedge fund data by year, including average values of management fee, incentive fee, the minimal investment, initial net asset value (NAV), NAV, assets under management (AUM), and the mean, standard deviation, minimum, and maximum monthly returns of average equal-weighted fund portfolios. In the Panel B of Table 1, we report the same set of summary statistics for hedge funds by strategies, including equity-style, non-equity style, and FOFs. Our classification of equity-style funds follows a more strict definition of equity-oriented funds as in Agarwal and Nail (2004) and Agarwal et al. (2017), which includes long/short equity hedge, equity market neutral, and dedicated short bias. The detailed comparison between our strategy classification and previous papers can be found in Table A.1.[8]

2.3 Macroeconomic factors

Following Shen et al. (2017), we use ten macroeconomic variables to capture various aspects of macroeconomic risk: (1) CON: the monthly real growth rate of personal consumption expenditures on nondurable goods and services per capita; (2) TFP: the quarterly percentage change of total factor productivity; (3) IPG: the monthly growth rate of industrial produc-

[8] Agarwal and Naik (2004) analyze the equity-oriented hedge fund strategies whose payoff arises primarily from the relative mispricing of securities or taking directional bets using both the Hedge Fund Research (HFR) and CSFB/Tremont indexes, namely event arbitrage, restructuring, event driven, relative value arbitrage, convertible arbitrage, long/short equity, and dedicated short bias. Agarwal et al. (2017) define equity-oriented funds as those with strategies of emerging markets, event driven, equity long-short, equity market Neutral, short bias as equity-oriented funds. Thus, the intersection of the two definitions of equity-oriented funds includes long/short equity hedge, equity market neutral, dedicated short bias, and event driven. Because of the extensive use of distressed bonds in the event driven strategy, we exclude event driven funds in our final equity-style subsample. However, the results for alternative classifications of sub-strategy samples are very similar to the main findings.

tion; (4) TERM: the yield spread between the 20-year and the 1-year Treasury bonds; (5) DEF: default premium measured as the monthly change of the yield spread between the BAA-rated and the AAA-rated corporate bonds; (6) UI: unanticipated inflation estimated following Chen, Roll and Ross (1986); (7) DEI: the change in monthly expected inflation estimated following Fama and Gibbons (1984); (8) VOL: the change in monthly market-wide aggregate volatility; (9) MKT: the value-weighted excess returns of the stock market; (10) LAB: log growth rate in nominal labor income per capita. Detailed description of these macro related risk factors can be found in Section 3.2 of Shen et al. (2017).

Panel C of Table 1 presents the summary statistics of the ten macroeconomic risk factors, including their correlation with lagged BW sentiment index, correlation with the monthly change in BW index, the AR(1) coefficient, the mean, standard deviation, 10th percentile, median, and the 90th percentile. Consistent with the previous literature, all ten factors exhibit little persistency endorsing their ability to capture the unexpected "shock" to market participants. Further, the correlation coefficients between macro risk factors and the lagged investor sentiment/change in sentiment are low and have different signs across factors, indicating that investor sentiment per se does not affect macroeconomic related variations in the time series.

2.4 Hedge fund portfolios sorted by macro-factor betas

We estimate hedge funds' pre-ranking macro-factor betas using a 24-month rolling-window with a minimum observation requirement of 18 months. Specifically, for each macro factor, betas of individual hedge funds are estimated with a univariate factor model.[9] Equal-weighted decile portfolios are formed each month according to funds' macro-factor betas.

[9]Our single-factor model specification follows Shen et al. (2017). In the robustness tests, we re-estimate funds' betas using a two-factor model including the macro-related factor and the market factor, following Gao et al. (2018). We also estimate the macro-factor betas as the sum of contemporaneous and lagged factor betas following Asness et al. (2001) to alleviate the concern of smoothed reported returns. Results with alternative beta estimation methods are similar.

Funds with the largest/smallest exposures to one macro risk are assigned to Decile 10/1.[10] In addition to the ten sets of decile portfolios formed based on ten macro-risk factors, we also form ten portfolios based on a composite beta score (COMP), which is computed as an arithmetic average of a fund's rank for each of the ten macro-factor betas. Last, an "Ave" portfolio takes the equal position across individual macro-beta-sorted decile portfolios.

3 Empirical results

Our empirical tests share similar design as in Stambaugh et al. (2012) and Shen et al. (2017). Unlike Stambaugh et al. (2012) and Shen et al. (2017) who use anomaly portfolios and macro-factor-beta sorted stock portfolios respectively, we focus on hedge fund portfolios.

3.1 Average returns of macro-factor-beta sorted hedge fund portfolios

Asset pricing theories predict that assets, including hedge funds, that comove strongly with systematic risk factors, including macroeconomic risk factors, should earn high returns. Panel A of Table 2 reports the average monthly excess returns of hedge fund portfolios with the highest and the lowest decile macro factor betas, as well as excess returns of the high-minus-low portfolio. We find that there is a flattened risk-return relation across all macro-risk-factor sorted hedge fund portfolios. Among all the "High-Low" return spreads sorted by 10 macro-risk-factor betas, none is statistically significant. Moreover, some return spreads are even negative, indicating that high-macro-beta hedge funds instead earn lower returns. The return spread of "High-Low" composite beta score sorted portfolio is 0.24% per month and the average return across 10 "High-Low" spreads is 0.1% per month, neither

[10] Following Shen et al. (2017), we multiply pre-ranking betas of TERM, DEF, and VOL by -1 to reflect the "opposite" risk nature of these three factors.

of which is statistically significant. Similar close to zero return spreads can also be found in macro-beta-sorted portfolios using equity, non-equity, and FOF type hedge funds. The flattened risk-return relation across all macro-risk-factor sorted hedge fund portfolios suggest that unconditionally, funds' exposures to macro factors do not explain cross-fund return variations.

One possible explanation of the failure of risk-return relation is that hedge funds, as the most sophisticated institutional investors, dynamically adjust their risk loadings to macro risks so promptly that pre-ranking betas are poor proxies for post-ranking betas. However, we find little evidence supporting this explanation. Panel B of Table 2 reports the ex post betas of those extreme and difference portfolios in Panel A. Out of the ten macro factors, only the two inflation related factors and labor income growth exhibit insignificant ex post beta spread across the two extreme macro-beta portfolios. The economic magnitude of ex post beta spread ranges from 0.11 (unexpected inflation factor) to 10.02 (default premium factor) and all beta spreads are positive. Together with the almost zero return spread across high and low macro beta portfolios, it is puzzling that funds' macro risk exposures do not account for cross-fund return differences.

3.2 Average returns following high and low sentiment months

Next, we investigate how investor sentiment levels measured by the BW index affects the macro-risk-return relation for hedge funds. Following Stambaugh et al. (2012) and Shen et al. (2017), we classify the full sample into two subsamples based on the BW index: a month is classified into the high (low) sentiment subsample if the BW index in the previous month is higher (lower) than the median value of the entire BW sentiment series.[11]

[11] Over our hedge fund sample period of 1997/1 to 2017/12, 112 out of 252 months are classified as high-sentiment and the remaining months are classified as low-sentiment. We also classify hight- and low-sentiment months according to the median BW index of the 252-month hedge fund sample and the results are available upon request.

Table 3 reports the average excess returns of macro-factor-beta sorted hedge fund portfolios following high- and low-sentiment months, as well as the return differences between these two subsamples. Several findings worth discussing. First, following low-sentiment months, the return difference of high- and low-macro-risk hedge fund portfolios is positive in general. The "High-Low" difference for the composite macro beta score sorted portfolios is 0.91% per month (t-statistics = 2.07) and the average "High-Low" return spread across ten macro risk factors is 0.53% per month (t-statistics = 1.83). Across the individual macro-risk-factor sorted return spreads, eight of them are positive and four are statistically significant. Only two macro risk factors (consumption growth and term spread growth) produce negative return spreads which are nevertheless statistically insignificant. The positive risk-return relation supports the theoretical predictions that funds with larger macro-risk exposures should earn higher returns as long as the market is rational.

Second, following high-sentiment months, the average return spread across high- and low-risk hedge funds is slightly negative (-0.29% per month) and statistically insignificant (t-statistics = -1.29). While this finding is different from the one in Shen et al. (2017) who use stocks as testing assets, it is actually consistent with theoretical prediction. During high-sentiment period, holdings of hedge funds are also likely to be affected by market-wide overpricing; the magnitude of such sentiment-induced overpricing is larger for funds whose holdings have larger factor betas. As a result, the more severe overpricing during high-sentiment months can lead to lower returns in the subsequent months for high-risk funds, which may dampen the positive risk-return relation. The net effect could result in a less positive, flat, or even negative relation between factor betas and funds' returns.

Third, the difference between return spreads of "High-Low" portfolio following high and low sentiment months is economically and statistically significant. The average difference between the return spreads across the two regimes is -0.82% per month (t-statistics = -2.48) and the number for the composite-beta-score-based spread is even larger of 1.3% per month

(t-statistics = -2.46). Similar to results found in stocks, managed hedge fund portfolios also exhibit the two-regime phenomenon of the risk-return relation conditional on market-wide investor sentiment.

Lastly, while both low- and high-risk hedge fund portfolios earn positive and significant returns following low-sentiment months, the impact of high sentiment on next month's return is larger for high-risk funds. As a comparison, the return difference between two sentiment regimes is -1.40% per month (t-statistics = -2.86) for the high-risk fund portfolio, while the number is only -0.57% (t-statistics = -2.25) for the low-risk fund portfolio. This observation suggests that even for these sophisticated hedge funds, large exposures to macroeconomic risk could still make them more inclined to be affected by the strong mispricing effect during high-sentiment period when most market participants are irrational.

In the baseline results, macro-factor-beta sorted portfolios are formed using all hedge funds. Table 4 reports the two-regime "High-Low" return spreads of hedge fund portfolios constructed using subsamples of hedge funds categorized by strategies. Columns 2-4, 5-7, 8-10 present the return spreads for hedge funds with strategy style of equity, non-equity, and FOF, respectively. The return difference between "High-Low" equity-style hedge fund portfolio following high- and low-sentiment months is slightly larger than that using all funds, with an average monthly excess return of -1.05% (t-statistics = -2.50). Meanwhile, the two-regime effect is weaker among non-equity funds with a monthly return spread of -0.67% that is marginally significant (t-statistics = -1.92). The weaker effect in non-equity funds is not surprising as those macroeconomic factors are empirically known to have effects on stocks, as documented in Shen et al. (2017).

In contrast, the average return difference for the "High-Low" FOF portfolio following high- and low-sentiment months is economically small (-0.36%) and statistically insignificant (t-statistics = -1.37). We conjecture that as FOFs try to diversify their investment across asset classes and strategies, it is unclear whether and how their returns comove with risk

factors. Therefore, the beta-return relation may be contaminated regardless the sentiment state. Our empirical observation seems to be consistent with this conjecture: the "High-Low" return spread is almost zero (0.15%) even after low-sentiment months when market tends to be rational. This can also be seen in the ex post factor betas of FOF "High-Low" spread portfolio (Panel B of Table 2): six out of ten ex post beta spreads are either negative or insignificant, suggesting the noisy nature of FOF's macro beta estimation.

Table 5 reports the Fung-Hsieh eight-factor model adjusted alphas for "High-Low" hedge fund portfolios constructed using all funds, equity funds, and non-equity funds, respectively, under two sentiment regimes.[12] For both all-fund and equity-fund cases, the two-regime phenomena are still in presence after hedge fund risk adjustment. However, the source of the return difference following the high- and low-sentiment months is different compared to the raw return case. Let us take the result using all funds to illustrate. Following low-sentiment months, the eight-factor adjusted alpha of the "High-Low" portfolio is reduced to almost zero (6 bps with the t-statistics of 0.49). The strong explanatory power of risk-based model for the "High-Low" hedge fund portfolio returns supports our hypothesis that market participants are more likely to be rational during low-sentiment period and standard asset pricing models are at work. On the other hand, the insignificant raw return after high-sentiment months become more negative and statistically significant (-0.34% with a t-statistics of -2.20). This latter finding is consistent with Chen et al. (2018) and Herskovic et al. (2018), who document that risk-adjustment could mechanically result in negative alpha spread for portfolios with difference in factor betas. While these two papers focus on stock portfolios and tradable stock-based factors, our result indicates that a similar effect is also observed in hedge funds with macroeconomic risk factor exposures.

[12]Fung-Hsieh eight-factor model includes the seven hedge fund risk factors used in Fung and Hsieh (2004) and the emerging market factor used in Fung and Hsieh (2001). Seven factors are bond trend-following factor, currency trend-following factor, commodity trending-following factor, equity market factor, the size spread factor, the bond market factor, and the credit spread factor. The factor data are downloaded from https://faculty.fuqua.duke.edu/∼dah7/HFRFData.htm.

Columns 5-7 of Table 5 report the Fung-Hsieh model adjusted alphas for the "High-Low" portfolios constructed using equity funds. The two-regime phenomenon has a slightly larger economic magnitude compared to the one with all funds. The factor adjusted alphas of non-equity "High-Low" hedge fund portfolio do not exhibit any difference across high- and low-sentiment periods, as shown in the last columns of Table 5.

3.3 Results of predictive regressions

Results in the previous subsection show that two regimes exist for the risk-return relation of macro-factor-beta sorted hedge fund portfolios. In this subsection, we confirm this relation by conducting time series regressions of macro-factor-beta sorted portfolios on lagged BW sentiment index and change in sentiment. Panel A of Table 6 reports the estimated coefficients and the associated t-statistics of univariate regressions where the lagged sentiment index is the single explanatory variable. For the ten "High-Low" macro-beta-sorted portfolios, coefficients on the lagged sentiment index are all negative with nine of them being statistically significant at at least 10% level; the default premium factor is the only exception. The composite-beta-score sorted "High-Low" portfolio has a coefficient of -1.76 with a t-statistic of -3.69. The coefficient for the average portfolio is -1.12 with a t-statistic of -3.30. In addition, the estimated coefficients for those high-beta portfolios are negative and larger in magnitude comparing to those low-beta portfolios (Columns 2 and 5 of Panel A).

Panel B of Table 6 reports the estimated coefficients for regressions of macro-factor-beta sorted portfolios on contemporaneous change in sentiment. We include the market factor as a control variable because of the known positive comovement between sentiment changes and market returns. According to our story, high-macro-beta funds should be more sensitive to sentiment change. This is empirically supported by the larger estimates for high-beta fund portfolios. On average, the contemporaneous change in sentiment has stronger impact on high-risk funds than low-risk funds and the impact difference is statistically significant at

0.01 significance level.

In sum, predictive regressions confirm that the macro-risk-return relation for the hedge fund portfolios can sometime be weakened due to strong mispricing induced by high-sentiment, especially for funds whose holdings have larger macro-risk exposures.

3.4 Results of equity mutual fund portfolios

Previous researchers find that equity mutual fund managers may tilt their portfolios toward high CAPM-beta stocks for various reasons such as maintaining tracking errors (Christoffersen and Simutin (2017)) or their desire for embedded leverage (Boguth and Simutin (2018)). However, it is not clear whether mutual funds' macro-risk-return relation is affected by market-wide sentiment. In the Appendix, Table B.1 shows that the unconditional risk-return relation is not evident for mutual funds with return spread for the "High-Low" macro-risk portfolio being almost zero.

Table 7 reports the results of macro-beta sorted equity mutual fund portfolios following high- and low-sentiment months.[13] The composite macro-beta score sorted "High-Low" portfolio has a monthly return spread of 0.70% (t-statistics = 2.33) following low-sentiment months. The number is 0.28% (t-statistics = 1.95) for the average "High-Low" portfolio across ten macro-beta sorted difference portfolios. Similar to hedge funds, the macro-risk-return relation is negative with moderate economic magnitude but statistically insignificance following high-sentiment months. Overall, the average return difference of "High-Low" portfolio after high- and low-sentiment months is -0.62% (t-statistics = -2.24). Mutual funds with different levels of macro-risk exposures also exhibit different risk-return patterns across two sentiment regimes.

[13]The detail of mutual fund data construction are in Appendix Section A.1. To make it comparable with our main hedge fund analyses, the mutual fund sample is from 1997/1 to 2017/12. Results using the full mutual fund sample from 1980/1 to 2017/12 are similar and available upon request.

4 Robustness tests and additional discussions

This section provides additional robustness tests and further discussions on our main results. This includes repeating the main empirical exercises using other classifications of hedge fund styles, alternative sentiment measures, and additional portfolio formation procedures. In addition, we examine whether our findings hold at the fund management level. Last, the alternative explanation of fund manager's skill at good and bad periods is discussed.

4.1 Other classifications by hedge fund investment styles

In the previous section, we find that the two-regime phenomenon of hedge funds' risk-return relation with respect to macro risks is stronger, both statistically and economically, within equity-style hedge funds. There are two commonly used fund classification methods to define equity-oriented hedge funds in the literature: the ones described in Agarwal and Naik (2004) and Agarwal et al. (2017). We adopt a stricter definition for equity-oriented funds in our main analysis by only looking at funds that are classified as an equity fund under both classifications. We also examine whether our findings hold for the two subsamples of equity-oriented hedge funds classified under each of the two methods. Results are positive: the economic magnitude and statistic significance are similar using these two classification methods. Therefore, the strong two-regime effect observed in equity hedge funds is not sensitive to the choice of equity fund classifications.

Bali et al. (2014) classify hedge funds into directional, semi-directional, and non-directional groups based on their willingness to take directional market exposure, and examine whether funds' exposures to macroeconomic uncertainty explain cross-sectional fund returns. Specifically, they classify funds that willingly take directional market exposure and risk as directional, funds that try to minimize market exposure as non-directional, and others in the middle as semi-directional. We find that the two-regime effect is observed in the

semi-directional and non-directional subsamples, but not for the directional subsample. This result could be due to directional funds' timing trades on risk exposures that offset the effect of sentiment-induced mispricing.

These results described above on alternative classification of hedge fund styles can be found in the Appendix Table B.2.

4.2 Alternative investor sentiment measures

While BW sentiment index is arguably the most widely used measure for investors' sentiment, our results are robust to alternative sentiment measures. Specifically, we consider two alternative sentiment measures. The first one is the augmented BW index proposed by Huang et al. (2015). They find that this augmented BW index has strong time series predictive power for the aggregate stock market. The second one is the the survey-based Michigan Consumer Sentiment Index. This index is known to capture social sentiment in a broader sense relative to the BW index that is constructed only using stock market variables. To isolate the sentiment component from business cycle component, we use the residual of Michigan index regressed on the six sentiment proxies of Baker and Wugler (2006) as another sentiment measure. We find that replacing the original BW index with these two alternative measures do not affect our main finding. The two-regime phenomenon of macro-factor-beta sorted hedge fund portfolios is still in presence just with slightly smaller statistical significance. These results are reported in Appendix TableB.3.

4.3 Other portfolio formation procedures

Our results are also robust to alternative portfolio formation procedures. First, in addition to the equal weighting used in the main analysis, we also form value-weighted hedge fund portfolios using funds' AUM in the previous month as weights. Second, we consider two alternative models for beta estimation: a two-factor model controlling for the market factor

and a two-factor model with both the contemporaneous macro factor and the lagged macro factor. The first model follows Gao et al. (2018)). The second model follows Asness et al. (2011) in order to address the issue of strong serial correlation in reported hdege fund returns due to stale prices and managers' incentives to smooth returns (see, e.g., Getmansky et al. (2004) and Jagannathan et al. (2010)). We use the average of the two betas to alleviate the concern of return serial correlations.

The results of all the above three portfolio formation methods are quite similar to the one found in the main result: the return spread of high and low macro-beta hedge fund portfolios is positive and significant after low sentiment months, negative after high sentiment months, and the difference in these two return spreads after high and low sentiment periods is statistically and economically significant. Detailed results are reported in Appendix Table B.4.

4.4 Results at fund management company level

We also examine whether our findings hold at fund management companies by averaging funds' returns at the management company level. The two-regime phenomenon is similar in economic magnitude but with slightly larger statistical significance. This is probably due to the smoothed manager level returns. Both hedge fund managers and mutual fund managers with high macro-risk exposures exhibit higher returns after low-sentiment months, while the effect is not statistically significant for mutual fund managers. On the other hand, after high-sentiment months, high macro-risk-beta managers deliver negative but insignificant returns, suggesting that fund management companies are also likely to be affected by sentiment-induced mispricing during high-sentiment periods. Results of hedge fund managers and mutual fund managers can be found in Appendix Tables B.5 and B.6, respectively.

4.5 An alternative explanation of fund managers' skill

Hedge funds are actively managed portfolios and thus the managers can dynamically choose beta loadings on various risk factors. It is possible that the estimated macro-factor betas measure fund managers' skill, which could be affected by investor sentiment. If it is the case, we would expect that managers' skill is more valuable during bad times as it is difficult to distinguish good and bad managers during bull markets. As a result, high-macro-beta funds may be those with bad skill that deliver more negative returns during market downturns. We divide the sample to NBER recessions and normal months and find that the hedge fund return spread between high- and low-macro-beta portfolios is indeed more negative during recessions. While the difference between normal months and recession months is not statistically significant, the economic magnitude is larger than 1% per month (Appendix Table B.7). Therefore, we cannot completely rule out the possibility that those low-macro-beta funds have better management skill.

5 Conclusion

In this paper, we find that while on average the risk-return tradeoff is unclear for hedge funds with macroeconomic risk exposures, the economic-theory-suggested risk-based explanation for cross hedge fund returns remain to work when the market is rational. On the other hand, the failure of funds' risk-return tradeoff during high-sentiment period indicates that even for sophisticated market participants such as hedge funds, sentiment-induced mispricing could affect their contemporaneous portfolio values and performance evaluation against risk-based benchmarks. As a result, the potential impact of behavioral factors shall be taken into consideration for empirical investigations on hedge funds' risk exposures and returns. We leave detailed investigation on the mechanism of how hedge funds are affected by mispricing, specifically whether they actively ride on mispricing or being passively affected via their

holdings' beta exposure, to future research.

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Figure 1: Investor Sentiment and Next-Month Returns of Hedge Fund Indices

The figure plots the monthly time series of Baker-Wurgler (BW) sentiment index and next-month returns of various hedge fund indices. BW sentiment index is constructed as the first principal components of five sentiment proxies, including the closed-end fund discount, the number and the average of the first-day returns on IPOs, the dividend premium, and the equity share in new issues. Hedge fund indices are from HFRI and include the HFRI fund weighted composite index (FWCI), the aggregate indices of equity hedge funds (EH), the event-driven funds (ED), the global macro funds (M), the relative value funds (RV), the emerging market funds (EM), and a composite index for fund of funds (FOF). The correlation between sentiment index and the next-month index return is reported. The sample period is from 1997/1 to 2017/12.

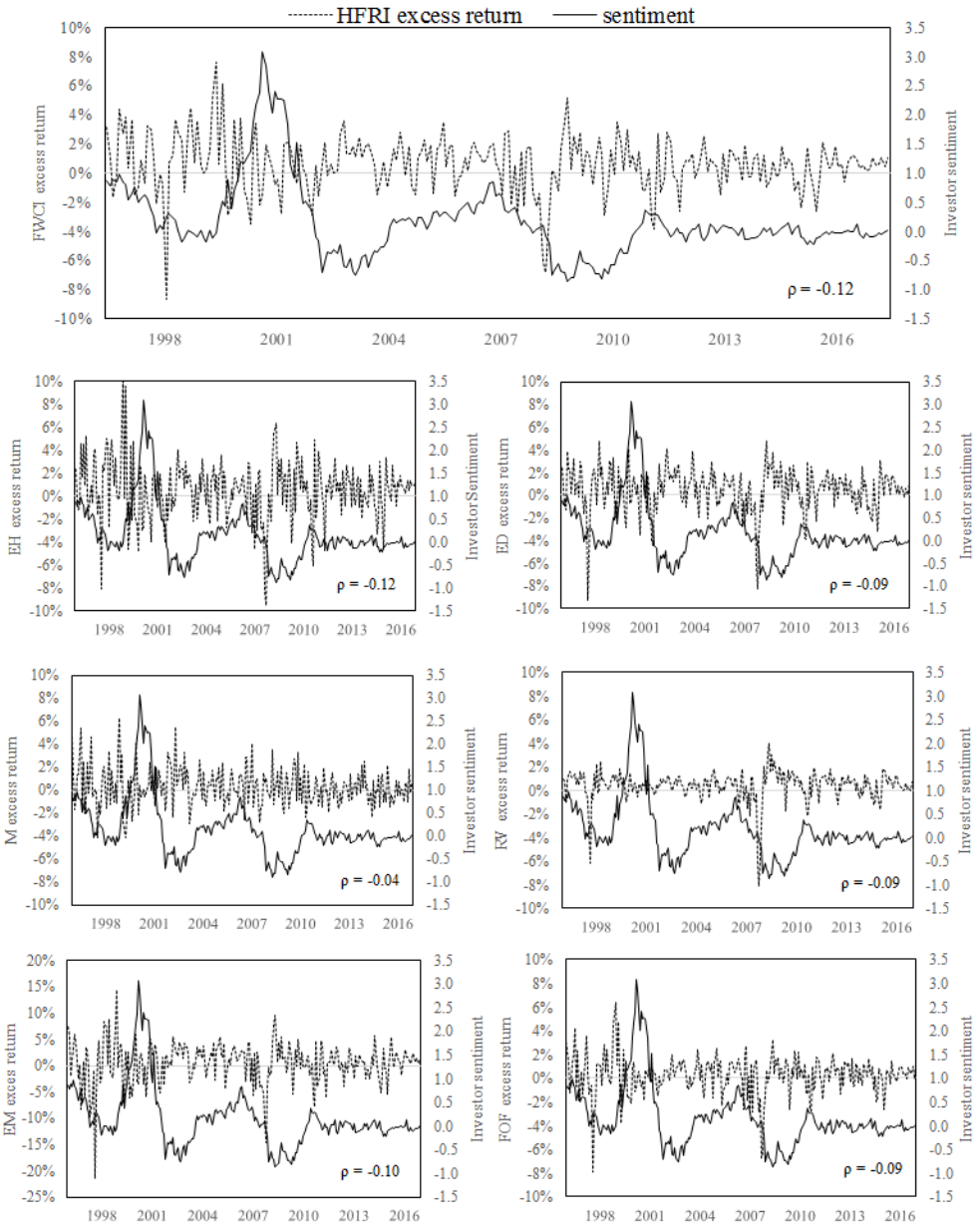

Table 1: Summary Statistics

This table presents summary statistics. We drop hedge funds that have less than 18 months of return history in the Lipper TASS database. We require hedge funds to have at least $10 million AUM each month. Panels A and B report summary statistics for hedge funds by year and by investment style, respectively. Summary statistics include total number of funds, total number of graveyard funds, average management fee (%), average incentive fee (%), minimum investment, average initial net asset value (NAV), average NAV, average AUM (million), the mean, the standard deviation, the minimum, and the maximum of monthly equal-weighted returns of hedge fund portfolios. Panel C reports the summary statistics of ten macroeconomic risk factors. The sample period is from 1997/1 to 2017/12.

Panel A: Summary statistics of hedge funds by year

Year	Total No.	Graveyard No.	mgt_fee (%)	inc_fee (%)	Minimum investment (thousand)	Initial NAV	NAV	AUM (million)	EW fund ret (mean)	EW fund ret (std.)	EW fund ret (min)	EW fund ret (max)
1997	563	29	1.4	15.7	770.3	2108.3	3810.8	86.6	0.011	0.019	-0.022	0.036
1998	763	48	1.4	16.2	921.8	1769.9	3337.0	80.4	-0.002	0.031	-0.087	0.033
1999	900	55	1.3	16.3	909.6	1247.4	2798.5	70.2	0.021	0.023	-0.008	0.073
2000	982	80	1.3	16.3	959.1	1150.1	3084.4	89.1	0.002	0.027	-0.032	0.056
2001	1492	93	1.3	16.9	953.2	1237.4	2911.8	105.3	0.003	0.017	-0.028	0.029
2002	1713	69	1.3	17.0	960.0	1195.3	2728.1	111.5	0.000	0.012	-0.022	0.018
2003	1984	98	1.3	16.8	953.6	1672.8	4359.9	122.8	0.013	0.009	0.001	0.033
2004	2343	98	1.3	16.7	946.4	1537.5	4197.0	164.1	0.006	0.012	-0.012	0.028
2005	2841	140	1.4	16.6	1178.8	1409.6	3922.7	182.8	0.007	0.013	-0.016	0.020
2006	3021	226	1.4	16.4	1233.8	1400.2	4164.6	211.8	0.010	0.013	-0.016	0.033
2007	3338	350	1.4	16.0	1444.9	1825.1	4759.6	262.4	0.008	0.014	-0.018	0.028
2008	3951	510	1.4	14.3	1694.3	2185.6	4347.3	227.4	-0.020	0.028	-0.073	0.017
2009	3626	456	1.4	14.2	1562.7	2446.0	4640.6	144.9	0.016	0.016	-0.010	0.052
2010	3792	361	1.4	14.4	1498.9	3068.7	5622.5	161.1	0.007	0.017	-0.030	0.031
2011	3560	488	1.4	14.3	1521.8	2731.1	5687.0	172.8	-0.005	0.018	-0.038	0.025
2012	3158	404	1.4	14.3	1624.3	2374.2	5570.9	185.5	0.006	0.014	-0.026	0.027
2013	2702	360	1.4	14.3	1105.6	2114.0	5519.2	207.5	0.009	0.011	-0.016	0.028
2014	2423	243	1.4	14.4	1134.1	960.1	4450.3	230.1	0.002	0.008	-0.008	0.016
2015	2114	177	1.4	14.3	1211.5	3420.5	53845.3	248.8	-0.001	0.013	-0.022	0.018
2016	1761	149	1.4	14.1	1336.1	3986.7	58792.1	237.4	0.003	0.012	-0.027	0.018
2017	1521	208	1.4	14.3	1340.4	4462.7	70233.2	1100.1	0.007	0.003	0.003	0.012
Total	8465	4642	1.4	15.4	1202.9	2109.7	12323.0	209.6	0.005	0.016	-0.024	0.030

Table 1 (cont.): Summary Statistics

Panel B: Summary statistics of hedge funds by investment style

Style	Total No.	Graveyard No.	mgt_fee (%)	inc_fee (%)	Minimum investment (thousand)	Initial NAV	NAV	AUM (million)	EW fund ret (mean)	EW fund ret (std.)	EW fund ret (min)	EW fund ret (max)
Equity-style funds	2762	2433	1.4	18.6	1270.1	4759.0	40903.8	496.8	0.006	0.023	-0.077	0.095
Non-equity funds	3273	2693	1.5	17.4	1218.5	1868.7	3239.3	209.7	0.005	0.018	-0.100	0.057
FOF	2430	2076	1.3	7.9	1638.2	591.1	1283.5	124.7	0.003	0.017	-0.074	0.070

Panel C: Summary statistics of macro risk factors (%)

	Corr. S_{t-1}	Corr ΔS_t	AR(1)	Mean	Std.	P10	Median	P90
CON	-2.63	20.13	-8.31	0.13	0.26	-0.17	0.13	0.42
TFP	-13.69	18.75	8.00	0.24	0.59	-0.46	0.26	0.99
IPG	-5.92	7.17	24.88	0.11	0.67	-0.52	0.15	0.80
TERM	20.27	-0.65	35.75	0.00	0.20	-0.22	-0.01	0.25
DEF	13.19	-17.52	46.71	0.00	0.12	-0.09	-0.01	0.09
UI	-6.29	23.61	43.08	0.00	0.37	-0.39	-0.02	0.44
DEI	-12.37	18.94	23.42	0.00	0.06	-0.06	0.00	0.07
VOL	3.94	-19.40	-38.83	-0.66	88.89	-102.23	-3.39	112.13
MKT	-17.33	34.57	11.29	0.35	4.53	-5.73	0.99	5.60
LAB	2.20	11.12	6.66	0.28	0.51	-0.11	0.29	0.64

Table 2: Macro-Factor-Beta Sorted Hedge Fund Portfolios

This table presents the monthly excess returns of hedge fund portfolios sorted by their exposures to ten macroeconomic risk factors. Individual hedge funds are sorted into 10 decile portfolios based on betas with respect to each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation of 18 months. Comp is the composite score across the ten macro-risk betas and Ave is the average portfolio across the ten macro-risk-beta sorted portfolios. Panel A reports the monthly excess returns for high-risk (Decile 10) and low-risk (Decile 1) hedge fund portfolios, as well as the return differences between the high-risk and the low-risk portfolios for the full sample, the equity-style subsample, the non-equity subsample, and the FOF subsample. Panel B reports the ex post betas for hedge fund portfolios. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

Panel A: Excess returns

	All hedge funds			Equity	Non-Equity	FOF
	High risk	Low risk	High-Low	High-Low	High-Low	High-Low
CON	0.18	0.55	-0.37	-0.22	-0.70	-0.09
	(0.60)	(2.46)	(-1.27)	(-0.53)	(-2.41)	(-0.37)
TFP	0.48	0.30	0.19	0.52	0.01	-0.12
	(1.35)	(1.92)	(0.58)	(1.20)	(0.03)	(-0.42)
IPG	0.43	0.19	0.24	0.16	0.40	0.16
	(1.34)	(1.11)	(1.00)	(0.49)	(1.32)	(0.71)
TERM	0.21	0.42	-0.21	-0.20	0.08	-0.48
	(0.75)	(1.68)	(-0.75)	(-0.47)	(0.24)	(-2.01)
DEF	0.19	0.43	-0.24	-0.69	0.24	-0.43
	(0.54)	(2.59)	(-0.79)	(-1.76)	(0.72)	(-1.61)
UI	0.48	0.26	0.22	0.03	0.48	0.10
	(1.89)	(1.09)	(1.10)	(0.09)	(2.13)	(0.47)
DEI	0.55	0.18	0.37	0.47	0.05	0.35
	(2.17)	(0.74)	(1.61)	(1.55)	(0.20)	(1.53)
VOL	0.56	0.20	0.36	0.41	0.67	-0.05
	(1.53)	(1.61)	(1.11)	(0.95)	(1.87)	(-0.19)
MKT	0.54	0.09	0.46	0.40	0.65	0.06
	(1.33)	(0.97)	(1.10)	(0.72)	(1.45)	(0.21)
LAB	0.30	0.31	-0.01	-0.38	0.09	0.16
	(0.89)	(1.51)	(-0.04)	(-0.87)	(0.27)	(0.57)
Comp	0.47	0.24	0.24	0.26	0.33	-0.12
	(1.42)	(3.32)	(0.73)	(0.64)	(0.95)	(-0.46)
Ave	0.39	0.29	0.10	0.05	0.20	-0.03
	(1.28)	(1.96)	(0.51)	(0.21)	(0.94)	(-0.23)

Table 2 (cont.): Excess Returns of Macro-Factor-Beta Sorted Hedge Fund Portfolios

Panel B: Ex post betas

	All hedge funds			Equity	Non-Equity	FOF
	High risk	Low risk	High-Low	High-Low	High-Low	High-Low
CON	2.97	-0.21	3.18	5.52	1.59	1.06
	(2.46)	(-0.24)	(3.43)	(3.00)	(2.05)	(1.32)
TFP	2.09	0.43	1.65	1.49	1.98	1.21
	(3.29)	(1.47)	(2.49)	(1.88)	(2.41)	(2.19)
IPG	0.87	0.38	0.49	0.15	0.88	0.45
	(2.85)	(1.50)	(1.98)	(0.36)	(3.52)	(1.96)
TERM	2.46	-1.90	4.37	5.04	3.18	4.23
	(1.87)	(-1.22)	(3.00)	(2.46)	(1.47)	(2.99)
DEF	-2.73	-12.75	10.02	9.64	11.59	3.37
	(-2.56)	(-4.58)	(3.51)	(2.72)	(3.75)	(0.76)
UI	1.48	1.36	0.11	-0.17	0.55	0.05
	(2.39)	(1.77)	(0.25)	(-0.21)	(1.18)	(0.14)
DEI	9.85	6.57	3.28	3.33	3.06	3.13
	(2.51)	(1.28)	(0.74)	(0.40)	(0.82)	(1.06)
VOL	-0.50	-1.49	0.99	1.63	0.79	0.40
	(-4.55)	(-3.93)	(2.95)	(3.31)	(2.37)	(1.31)
MKT	1.05	-0.09	1.15	1.56	1.02	0.54
	(21.12)	(-3.50)	(21.08)	(15.60)	(18.26)	(11.96)
LAB	1.54	0.97	0.57	0.40	0.85	-0.21
	(2.38)	(2.72)	(1.16)	(0.68)	(1.48)	(-0.32)

Table 3: Macro-Factor-Beta Sorted Hedge Fund Portfolios following High and Low Sentiment

This table presents the monthly excess returns of hedge fund portfolios sorted by their exposures to ten macroeconomic risk factors following high and low sentiment months. High- and low-sentiment months are classified based on the median level of the BW sentiment index. Individual hedge funds are sorted into 10 decile portfolios based on betas w.r.t each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp indicates the portfolios sorted on the composite score across the ten macro-risk betas. Ave indicates the average portfolio across the ten macro-risk-beta sorted portfolios. The monthly excess returns for the high-risk (Decile 10) and the low-risk (Decile 1) hedge fund portfolios, as well as the return differences between the high-risk and the low-risk portfolios are reported. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

	Low risk			High risk			High risk-Low risk		
	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low
CON	0.13	1.01	-0.88	-0.26	0.66	-0.92	-0.39	-0.35	-0.04
	(0.47)	(3.17)	(-2.09)	(-0.73)	(1.58)	(-1.96)	(-1.05)	(-0.82)	(-0.08)
TFP	0.09	0.52	-0.43	-0.33	1.38	-1.71	-0.42	0.86	-1.28
	(0.54)	(2.06)	(-1.45)	(-0.80)	(2.78)	(-3.02)	(-1.13)	(1.71)	(-2.24)
IPG	-0.03	0.44	-0.47	-0.28	1.21	-1.49	-0.25	0.77	-1.01
	(-0.17)	(1.78)	(-1.60)	(-0.75)	(2.70)	(-2.86)	(-0.80)	(2.47)	(-2.50)
TERM	-0.12	1.01	-1.13	-0.26	0.72	-0.98	-0.14	-0.29	0.15
	(-0.36)	(3.39)	(-2.62)	(-0.83)	(1.71)	(-2.10)	(-0.39)	(-0.71)	(0.29)
DEF	0.09	0.81	-0.72	-0.45	0.89	-1.34	-0.54	0.08	-0.63
	(0.55)	(2.92)	(-2.18)	(-1.09)	(1.83)	(-2.35)	(-1.55)	(0.16)	(-1.08)
UI	-0.08	0.63	-0.71	-0.11	1.12	-1.23	-0.03	0.49	-0.52
	(-0.27)	(2.08)	(-2.01)	(-0.42)	(2.99)	(-2.82)	(-0.12)	(1.57)	(-1.36)
DEI	-0.23	0.63	-0.86	-0.05	1.20	-1.25	0.19	0.58	-0.39
	(-0.76)	(1.93)	(-2.22)	(-0.17)	(3.21)	(-2.84)	(0.69)	(1.51)	(-0.86)
VOL	0.13	0.27	-0.14	-0.25	1.44	-1.69	-0.38	1.17	-1.55
	(0.78)	(1.73)	(-0.69)	(-0.61)	(2.73)	(-2.80)	(-0.99)	(2.55)	(-2.85)
MKT	0.07	0.1	-0.03	-0.34	1.50	-1.84	-0.41	1.40	-1.81
	(0.56)	(0.91)	(-0.19)	(-0.71)	(2.52)	(-2.69)	(-0.80)	(2.39)	(-2.60)
LAB	0.14	0.50	-0.37	-0.43	1.09	-1.52	-0.56	0.59	-1.16
	(0.48)	(1.76)	(-0.94)	(-1.14)	(2.34)	(-2.87)	(-1.46)	(1.28)	(-1.97)
Comp	0.15	0.33	-0.17	-0.23	1.24	-1.47	-0.38	0.91	-1.30
	(1.31)	(3.56)	(-1.11)	(-0.60)	(2.71)	(-2.82)	(-0.94)	(2.07)	(-2.46)
Ave	0.02	0.59	-0.57	-0.28	1.12	-1.40	-0.29	0.53	-0.82
	(0.10)	(3.00)	(-2.25)	(-0.80)	(2.58)	(-2.86)	(-1.29)	(1.83)	(-2.48)

Table 4: Macro-Factor-Beta Sorted Hedge Fund Portfolios following High and Low Sentiment: Returns of Risk Spread Portfolios by Investment Style

This table presents the monthly return differences of high and low macro-beta-sorted hedge fund portfolios within each investment style following high and low sentiment months. High- and low-sentiment months are classified based on the median level of the BW sentiment index. Individual hedge funds are sorted into 10 decile portfolios based on betas w.r.t each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp indicates the portfolios sorted on the composite score across the ten macro-risk betas. Ave indicates the average portfolio across the ten macro-risk-beta sorted portfolios. The return differences of high-risk (Decile 10) and low-risk (Decile 1) portfolios are reported for the equity-style subsample, the non-equity subsample, and the FOF subsample. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

	Equity			Non-equity			FOF		
	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low
CON	-0.47	0.05	-0.51	-0.53	-0.88	0.35	-0.05	-0.13	0.07
	(-0.87)	(0.08)	(-0.67)	(-1.55)	(-1.95)	(0.65)	(-0.20)	(-0.34)	(0.17)
TFP	-0.39	1.50	-1.89	-0.35	0.41	-0.76	-0.64	0.45	-1.09
	(-0.65)	(2.75)	(-2.46)	(-0.97)	(0.67)	(-1.24)	(-1.64)	(1.27)	(-2.10)
IPG	-0.24	0.60	-0.84	-0.13	0.98	-1.11	-0.27	0.63	-0.90
	(-0.48)	(1.88)	(-1.43)	(-0.40)	(2.25)	(-2.29)	(-1.11)	(1.77)	(-2.21)
TERM	-0.17	-0.23	0.06	0.16	-0.01	0.16	-0.38	-0.59	0.21
	(-0.27)	(-0.45)	(0.08)	(0.49)	(-0.01)	(0.28)	(-1.08)	(-1.92)	(0.47)
DEF	-1.04	-0.31	-0.73	-0.02	0.53	-0.55	-0.46	-0.40	-0.07
	(-2.13)	(-0.52)	(-0.95)	(-0.05)	(1.01)	(-0.92)	(-1.23)	(-1.01)	(-0.12)
UI	-0.42	0.52	-0.94	0.31	0.67	-0.36	0.08	0.13	-0.06
	(-0.88)	(1.19)	(-1.57)	(1.13)	(1.91)	(-0.80)	(0.27)	(0.39)	(-0.13)
DEI	0.28	0.67	-0.39	-0.26	0.39	-0.65	0.59	0.09	0.50
	(0.73)	(1.45)	(-0.68)	(-0.77)	(0.94)	(-1.22)	(1.96)	(0.25)	(1.09)
VOL	-0.27	1.14	-1.41	-0.03	1.45	-1.48	-0.59	0.54	-1.13
	(-0.49)	(2.07)	(-1.97)	(-0.09)	(2.54)	(-2.41)	(-1.68)	(1.40)	(-2.27)
MKT	-0.72	1.63	-2.36	-0.07	1.44	-1.51	-0.36	0.52	-0.88
	(-0.95)	(2.30)	(-2.47)	(-0.14)	(2.12)	(-2.00)	(-1.09)	(1.28)	(-1.78)
LAB	-1.11	0.42	-1.53	-0.26	0.48	-0.75	0.04	0.29	-0.26
	(-1.95)	(0.70)	(-1.89)	(-0.62)	(0.91)	(-1.19)	(0.09)	(0.88)	(-0.49)
Comp	-0.49	1.08	-1.58	-0.19	0.90	-1.09	-0.27	0.05	-0.32
	(-0.88)	(2.15)	(-2.27)	(-0.52)	(1.67)	(-1.90)	(-0.82)	(0.14)	(-0.79)
Ave	-0.45	0.60	-1.05	-0.12	0.55	-0.67	-0.21	0.15	-0.36
	(-1.41)	(1.98)	(-2.50)	(-0.60)	(1.58)	(-1.92)	(-1.09)	(0.72)	(-1.37)

Table 5: Macro-Factor-Beta Sorted Hedge Fund Portfolios following High and Low Sentiment: Alphas of Risk Spread Portfolios

This table presents the monthly alpha differences of high and low macro-beta-sorted hedge fund portfolios following high and low sentiment months. High- and low-sentiment months are classified based on the median level of the BW sentiment index. Individual hedge funds are sorted into 10 decile portfolios based on betas w.r.t each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp indicates the portfolios sorted on the composite score across the ten macro-risk betas. Ave indicates the average portfolio across the ten macro-risk-beta sorted portfolios. The alpha differences of the high-risk (Decile 10) and the low-risk (Decile 1) portfolios are calculated w.r.t the Fung-Hsieh eight-factor model. Monthly alphas are reported for the full sample, the equity-style subsample, and the non-equity subsample. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

	All hedge funds			Equity			Non-equity		
	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low
CON	-0.44	-0.47	0.03	-0.70	-0.12	-0.57	-0.51	-0.95	0.44
	(-1.22)	(-1.12)	(0.06)	(-1.42)	(-0.21)	(-0.78)	(-1.46)	(-2.07)	(0.79)
TFP	-0.50	0.15	-0.65	-0.53	0.61	-1.15	-0.36	-0.32	-0.04
	(-1.89)	(0.48)	(-1.60)	(-1.17)	(1.61)	(-1.92)	(-1.26)	(-0.75)	(-0.09)
IPG	-0.35	0.30	-0.65	-0.48	0.15	-0.63	-0.25	0.56	-0.82
	(-1.29)	(1.19)	(-2.13)	(-1.09)	(0.40)	(-1.14)	(-0.87)	(1.60)	(-2.18)
TERM	-0.03	-0.33	0.30	0.00	-0.25	0.25	0.38	-0.20	0.58
	(-0.09)	(-0.81)	(0.58)	(0.01)	(-0.49)	(0.33)	(1.23)	(-0.41)	(1.09)
DEF	-0.44	-0.56	0.13	-0.86	-0.96	0.10	0.01	-0.22	0.24
	(-1.75)	(-1.51)	(0.29)	(-1.86)	(-1.88)	(0.14)	(0.05)	(-0.65)	(0.56)
UI	-0.05	0.30	-0.36	-0.33	0.39	-0.72	0.28	0.38	-0.10
	(-0.23)	(0.94)	(-1.02)	(-0.77)	(0.83)	(-1.29)	(0.95)	(1.21)	(-0.28)
DEI	0.11	0.44	-0.32	0.04	0.53	-0.49	-0.24	0.19	-0.43
	(0.40)	(1.15)	(-0.71)	(0.10)	(1.01)	(-0.78)	(-0.71)	(0.50)	(-0.88)
VOL	-0.56	0.32	-0.88	-0.49	0.07	-0.56	-0.12	0.60	-0.72
	(-2.97)	(1.77)	(-3.24)	(-1.61)	(0.21)	(-1.17)	(-0.44)	(2.08)	(-1.92)
MKT	-0.65	0.27	-0.92	-1.18	0.28	-1.46	-0.22	0.26	-0.48
	(-2.87)	(1.29)	(-3.61)	(-2.63)	(0.72)	(-2.65)	(-0.93)	(1.03)	(-1.55)
LAB	-0.48	0.20	-0.67	-0.99	-0.08	-0.91	-0.26	0.09	-0.35
	(-1.19)	(0.50)	(-1.31)	(-1.78)	(-0.17)	(-1.25)	(-0.56)	(0.19)	(-0.60)
Comp	-0.50	0.12	-0.62	-0.73	0.13	-0.86	-0.29	-0.01	-0.28
	(-2.04)	(0.68)	(-2.32)	(-1.95)	(0.41)	(-1.82)	(-1.68)	(-0.04)	(-1.12)
Ave	-0.34	0.06	-0.40	-0.55	0.06	-0.61	-0.13	0.04	-0.17
	(-2.20)	(0.49)	(-2.20)	(-2.30)	(0.33)	(-2.10)	(-1.00)	(0.26)	(-0.92)

Table 6: Predictive Regressions of Macro-Factor-Beta Sorted Portfolios on Lagged Investor Sentiment

This table presents the results of predictive regressions of macro-factor-beta sorted portfolios on BW investor sentiment index. Individual hedge funds are sorted into 10 decile portfolios based on betas w.r.t each of those three measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. The monthly excess returns of the Decile 10, the Decile 1, and the return differences of Decile 10 - Decile 1 are regressed on lagged sentiment index and change in sentiment index. Panels A presents the results when the lagged BW index is the single explanatory variable. Panel B presents the results when both the change in BW index and the market factor are the explanatory variables. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

Panel A: Regressions on S_{t-1}

	Low risk		High risk		High risk-Low risk	
	b	t	b	t	b	t
CON	-0.44	-1.37	-1.20	-3.22	-0.76	-1.73
TFP	0.02	0.17	-1.76	-3.93	-1.78	-4.28
IPG	-0.25	-1.14	-1.32	-3.26	-1.07	-3.24
TERM	-0.56	-1.98	-1.21	-3.18	-0.65	-1.76
DEF	-0.36	-1.99	-1.48	-3.04	-1.12	-2.25
UI	-0.38	-1.55	-1.15	-3.09	-0.77	-2.32
DEI	-0.59	-2.32	-1.09	-2.66	-0.50	-1.12
VOL	-0.20	-1.21	-1.64	-3.72	-1.44	-3.76
MKT	0.11	0.75	-1.72	-3.02	-1.82	-3.06
LAB	-0.13	-0.80	-1.41	-2.99	-1.28	-2.72
Comp	0.15	1.41	-1.61	-3.69	-1.76	-3.69
Ave	-0.28	-1.68	-1.40	-3.37	-1.12	-3.30

Panel B: Regressions on ΔS_t

	Low risk		High risk		High risk-Low risk	
	b	t	b	t	b	t
CON	-0.47	-2.66	1.38	3.28	1.85	4.45
TFP	0.21	0.88	0.90	3.00	0.69	2.18
IPG	-0.05	-0.17	0.52	2.31	0.57	1.92
TERM	0.24	1.08	0.57	1.55	0.33	0.84
DEF	0.36	1.27	0.64	2.17	0.28	0.71
UI	0.49	1.19	0.39	1.76	-0.10	-0.21
DEI	0.08	0.32	0.93	3.18	0.84	2.52
VOL	0.38	1.83	0.47	1.69	0.08	0.30
MKT	-0.16	-1.11	0.78	3.02	0.94	4.07
LAB	0.02	0.07	0.77	1.90	0.76	1.65
Comp	0.01	0.07	1.01	3.01	1.00	3.07
Ave	0.11	0.56	0.73	2.78	0.62	3.13

Table 7: Macro-Factor-Beta Sorted Mutual Fund Portfolios following High and Low Sentiment

This table presents the monthly excess returns of equity mutual fund portfolios sorted by their exposures to ten macroeconomic risk factors following high and low sentiment months. High- and low-sentiment months are classified based on the median level of the BW sentiment index. Individual equity mutual funds are sorted into 10 decile portfolios based on betas w.r.t each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp indicates the portfolios sorted on the composite score across the ten macro-risk betas. Ave indicates the average portfolio across the ten macro-risk-beta sorted portfolios. The monthly excess returns for the high-risk (Decile 10) and the low-risk (Decile 1) hedge fund portfolios, as well as the return differences between the high-risk and the low-risk portfolios are reported. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

	Low risk			High risk			High risk-Low risk		
	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low
CON	0.27	0.80	-0.53	-0.09	1.21	-1.30	-0.36	0.42	-0.77
	(0.84)	(1.81)	(-1.08)	(-0.17)	(2.20)	(-1.94)	(-0.93)	(1.21)	(-1.69)
TFP	0.35	0.80	-0.45	-0.23	1.16	-1.39	-0.59	0.36	-0.95
	(1.14)	(2.17)	(-1.02)	(-0.44)	(2.22)	(-2.09)	(-1.77)	(1.75)	(-2.54)
IPG	0.14	0.86	-0.72	-0.09	1.06	-1.15	-0.23	0.20	-0.43
	(0.39)	(1.79)	(-1.32)	(-0.18)	(2.15)	(-1.84)	(-0.86)	(0.95)	(-1.40)
TERM	0.14	0.90	-0.76	-0.06	1.03	-1.09	-0.20	0.13	-0.33
	(0.33)	(2.14)	(-1.36)	(-0.14)	(2.00)	(-1.82)	(-0.54)	(0.50)	(-0.79)
DEF	0.21	1.08	-0.87	-0.12	0.86	-0.98	-0.33	-0.22	-0.11
	(0.59)	(2.64)	(-1.72)	(-0.24)	(1.68)	(-1.53)	(-1.01)	(-0.78)	(-0.25)
UI	0.16	0.95	-0.79	-0.10	0.90	-1.00	-0.26	-0.05	-0.21
	(0.39)	(2.03)	(-1.45)	(-0.24)	(1.88)	(-1.69)	(-1.21)	(-0.25)	(-0.76)
DEI	0.10	0.75	-0.65	-0.03	1.17	-1.20	-0.13	0.41	-0.55
	(0.26)	(1.64)	(-1.22)	(-0.07)	(2.23)	(-1.93)	(-0.63)	(1.38)	(-1.63)
VOL	0.20	0.77	-0.57	-0.14	1.21	-1.35	-0.34	0.44	-0.78
	(0.71)	(2.35)	(-1.46)	(-0.26)	(2.22)	(-1.97)	(-1.06)	(1.69)	(-1.97)
MKT	0.19	0.44	-0.25	-0.20	1.39	-1.59	-0.40	0.94	-1.34
	(0.96)	(1.76)	(-0.87)	(-0.34)	(2.33)	(-2.10)	(-0.85)	(2.41)	(-2.42)
LAB	0.38	0.91	-0.52	-0.21	1.05	-1.25	-0.59	0.14	-0.73
	(1.18)	(2.30)	(-1.09)	(-0.40)	(2.04)	(-1.90)	(-1.73)	(0.57)	(-1.70)
Comp	0.20	0.59	-0.39	-0.16	1.29	-1.45	-0.36	0.70	-1.06
	(0.74)	(1.87)	(-1.04)	(-0.29)	(2.32)	(-2.11)	(-0.89)	(2.33)	(-2.36)
Ave	0.22	0.83	-0.61	-0.13	1.10	-1.23	-0.34	0.28	-0.62
	(0.66)	(2.13)	(-1.34)	(-0.26)	(2.16)	(-1.93)	(-1.33)	(1.95)	(-2.24)

Internet Appendix

This Internet Appendix consists of three sections. In Section A, we provide details of data construction. Section B presents additional results.

A Data Appendix

A.1 Mutual fund data

Mutual fund data of monthly returns and fund characteristics are obtained from the Center for Research in Security Prices (CRSP) Survivor-Bias-Free Mutual Fund Database. We obtain quarterly and semi-annual stock positions of funds from the Thomson Reuters Mutual Fund Holdings (formerly CDA/Spectrum S12) database. These two datasets are merged using the unique identifier WFICN in the Wharton Research Data Services MFLINKS file. Following the previous literature (see, e.g., Busse et al. (2017), Dong et al. (2018), and Boguth and Simutin (2018)), we limit our sample to actively managed diversified domestic equity mutual funds.[14]

We also introduce other standard filters for mutual fund data. First, only funds with

[14]First, we eliminate balanced, bond, index, international, commodity, and sector funds. In more details, we exclude funds in Thomson Reuters Mutual Fund Holdings database that have the Investment Objective Codes (IOC) being 1 (international), 5 (municipal bonds), 6 (bond and preferred), and 7 (balanced). We exclude funds in CRSP mutual fund database with policies including bond and preferred stocks, balanced fund, bonds, Canadian and international, government securities, money market fund, preferred stocks, and tax-free money market fund and only keep funds with the following CRSP objectives code: ED, EDCI, EDCL, EDCM, EDCS, EDYB, EDYG, EDYH, EDYI, EDYS, and M. Next, we add the filters based on various objective codes and detailed asset compositions. We select funds with the Lipper classification codes EIEI, G, LCCE, LCGE, LCVE, MCCE, MCGE, MCVE, MLCE, MLGE, MLVE, SCCE, SCGE, and SCVE. If the Lipper classification code for a fund is missing, we keep funds with the Strategic Insight objective code of AGG, GMC, GRI, GRO, ING, and SCG. If both Lipper classification and Strategic Insight objective code are missing, we keep funds with Wiesenberger objective code equal to G, G-I, AGG, GCI, GRI, GRO, LTG, MCG, and SCG. If none of these objective codes are available, we keep a fund if it has an "CS" policy. To exclude the index funds, we delete funds whose names contain any of the following strings: Index, Ind, Idx, Indx, Mkt, Market, Composite, S&P, Russel, Nasdaq, DJ, Dow, Jones, Wilshire, NYSE, iShares, SPDR, HOLDRs, ETF, Exchange-Traded Fund, PowerShares, StreetTRACKS, 100, 400, 500, 600, 1000, 1500, 2000, 3000, and 5000. We also exclude funds with a CRSP index fund flag equal to "\D" (pure index fund) or "\E" (enhanced index fund)

at least $10 million TNA at the end of each quarter and with at least 70% of assets invested in common stocks are kept. Second, we exclude fund-month observations with less than 10 different stocks in the portfolio holdings following Chen et al. (2018). Third, we address the incubation bias (Evans (2010)) by eliminating observations preceding the fund's starting year as reported in CRSP following Boguth and Simutin (2018). Fourth, we also drop duplicated funds and combine multiple share classes into a single fund. Our final mutual fund sample spans from 1980:01 to 2017:12 with 3976 unique funds.

Table A.1: Classification of Hedge Fund Styles

This table presents various types of classification for hedge fund investment styles. The first two columns present the Lipper TASS grouping of strategies and the number of funds for each strategy. The third to the fifth columns present the classification of hedge fund styles used in the main analysis of this paper. The rest of the columns present classifications of hedge fund styles considered in robustness tests: the sixth column presents the classification of equity-oriented hedge funds in Agarwal and Naik (2004). The seventh column presents the classification of equity-oriented hedge funds in Agarwal et al. (2017). The last three columns present the classification of directional type styles in Bali et al. (2014).

Primary category	NO. of funds	Equity	Non-equity	FOF	Equity oriented (2004)	Equity oriented (2017)	Directional	Semi-directional	Non-directional
Convertible arbitrage	211		✓		✓				✓
Dedicated short bias	48	✓			✓	✓			
Emerging markets	686		✓			✓	✓		
Equity market neutral	370	✓			✓	✓			✓
Event driven	638		✓		✓	✓		✓	
Fixed income arbitrage	236		✓						✓
Fund of funds	2430			✓				✓	
Global macro	415		✓				✓		
Long/short equity hedge	2344	✓			✓	✓		✓	
Managed futures	3		✓				✓		
Multi-strategy	581		✓					✓	
Options strategy	36		✓						
Other	382		✓						
Undefined	85		✓						
Total	8465	2762	3273	2430	3847	4086	1104	5993	817

B Additional Results

Figure B.1: Investor Sentiment and Next-Month Returns of Hedge Fund Indices

The figure plots the monthly time series of Baker-Wurgler (BW) sentiment index and next-month returns of various hedge fund indices. BW sentiment index is constructed as the first principal components of five sentiment proxies, including the closed-end fund discount, the number and the average of the first-day returns on IPOs, the dividend premium, and the equity share in new issues. Hedge fund sub-strategy indices are from HFRI, including the energy/basic materials index (EHE), the equity market neutral index (EHN), the quantitative directional index (EHQ), the technology/heathcare index (EHTE), the Asia ex-Japan index (EMA), the global index (EMG), the Latin America Index (EML), the Russia/eastern Europe index (EMR), the FOF conservative index (FOFC), the FOF diversified index (FOFD), the FOF market defensive index (FOFMD), the FOF strategic index (FOFS), the systematic diversified index (MSD), the distressed/restructuring index (EDD), the merger arbitrage index (EDM), the asset-backed index (RVFIAB), the convertible arbitrage index (RVFICA), the corporate index (RVFICO), the multi-strategy index (RVMS), and the yield alternatives index (RVYA). The correlation between sentiment index and the next-month index return is reported. The sample period is from 1997/1 to 2017/12.

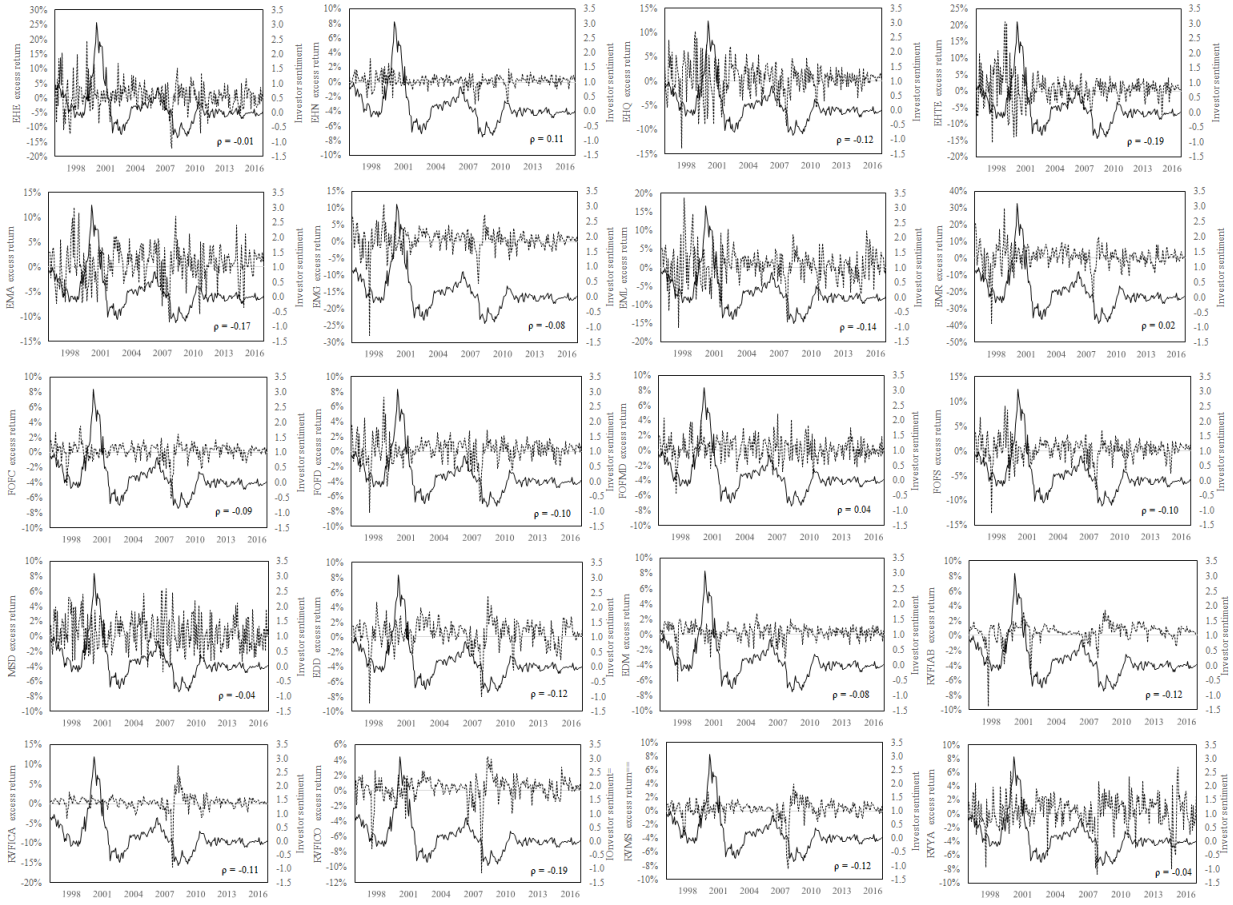

Table B.1: Macro-Factor-Beta Sorted Mutual Fund Portfolios

This table presents the monthly excess returns of equity mutual fund portfolios sorted by their exposures to ten macroeconomic risk factors. Individual mutual funds are sorted into 10 decile portfolios based on betas w.r.t each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp is the composite score across the ten macro-risk betas and Ave is the average portfolio across the ten macro-risk-beta sorted portfolios. Panel A reports the monthly excess returns for high-risk and low-risk mutual fund portfolios, as well as the return differences between the high-risk and the low-risk portfolios. Panel B reports the ex post betas for mutual fund portfolios. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

	Excess returns			Ex post betas		
	High risk	Low risk	High-Low	High risk	Low risk	High-Low
CON	0.53	0.52	0.01	5.34	1.72	3.62
	(1.33)	(1.85)	(0.04)	(3.19)	(1.90)	(2.78)
TFP	0.43	0.57	-0.14	2.55	1.72	0.82
	(1.10)	(2.31)	(-0.64)	(3.40)	(3.69)	(2.32)
IPG	0.46	0.49	-0.02	1.15	1.09	0.06
	(1.24)	(1.61)	(-0.13)	(2.85)	(2.81)	(0.34)
TERM	0.46	0.50	-0.04	0.91	-2.70	3.60
	(1.28)	(1.62)	(-0.18)	(0.44)	(-1.09)	(2.35)
DEF	0.35	0.63	-0.28	-7.38	-10.94	3.56
	(0.95)	(2.19)	(-1.31)	(-2.57)	(-2.35)	(1.70)
UI	0.38	0.54	-0.16	0.73	1.27	-0.54
	(1.13)	(1.65)	(-1.04)	(0.60)	(0.98)	(-1.49)
DEI	0.54	0.41	0.13	9.85	9.67	0.18
	(1.47)	(1.33)	(0.65)	(1.20)	(1.16)	(0.05)
VOL	0.51	0.47	0.03	-1.04	-1.77	0.74
	(1.28)	(2.10)	(0.16)	(-3.34)	(-3.55)	(2.91)
MKT	0.56	0.31	0.24	1.32	0.51	0.81
	(1.24)	(1.84)	(0.74)	(25.56)	(22.12)	(12.12)
LAB	0.39	0.63	-0.24	1.42	1.37	0.05
	(1.04)	(2.41)	(-1.14)	(2.29)	(2.82)	(0.21)
Comp	0.54	0.39	0.15			
	(1.29)	(1.81)	(0.54)			
Ave	0.46	0.51	-0.05			
	(1.23)	(1.94)	(-0.29)			

Table B.2: Excess Returns of Macro-Factor-Beta Sorted Hedge Fund Portfolios: Other Style Classifications

This table presents the monthly excess returns of hedge fund portfolios sorted by their exposures to ten macroeconomic risk factors following high and low sentiment months. High- and low-sentiment months are classified based on the median level of the BW sentiment index. Individual hedge funds are sorted into 10 decile portfolios based on betas with respect to each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp indicates the portfolios sorted on the composite score across the ten macro-risk betas. Ave indicates the average portfolio across the ten macro-risk-beta sorted portfolios. The monthly return differences between the high-risk and the low-risk portfolios are reported. Panel A presents the results using the subsample of equity-oriented hedge funds following Agarwal and Naik (2004) and Agarwal et al. (2017). Panel B presents the results using the style classification method proposed by Bali et al. (2014). The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

Panel A: Equity-oriented hedge funds

	Agarwal and Naik (2004)			Agarwal et al. (2017)		
	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low
CON	-0.38	-0.04	-0.34	-0.30	-0.31	0.01
	(-0.78)	(-0.08)	(-0.51)	(-0.65)	(-0.57)	(0.01)
TFP	-0.32	1.37	-1.69	-0.40	1.11	-1.51
	(-0.68)	(2.71)	(-2.64)	(-0.87)	(1.99)	(-2.33)
IPG	-0.23	0.55	-0.78	-0.47	0.69	-1.16
	(-0.58)	(2.09)	(-1.69)	(-1.09)	(1.95)	(-2.20)
TERM	-0.22	-0.28	0.06	0.05	-0.07	0.12
	(-0.48)	(-0.60)	(0.09)	(0.11)	(-0.13)	(0.18)
DEF	-0.88	-0.02	-0.86	-0.87	-0.05	-0.82
	(-2.09)	(-0.04)	(-1.26)	(-2.00)	(-0.08)	(-1.18)
UI	-0.39	0.38	-0.77	-0.20	0.55	-0.75
	(-1.11)	(0.96)	(-1.61)	(-0.56)	(1.43)	(-1.51)
DEI	0.13	0.64	-0.52	0.32	0.67	-0.35
	(0.40)	(1.54)	(-1.04)	(0.90)	(1.49)	(-0.62)
VOL	-0.43	1.05	-1.49	-0.60	1.31	-1.91
	(-0.90)	(2.03)	(-2.33)	(-1.26)	(2.26)	(-2.78)
MKT	-0.72	1.54	-2.26	-0.59	1.71	-2.30
	(-1.08)	(2.28)	(-2.62)	(-0.91)	(2.37)	(-2.62)
LAB	-1.09	0.45	-1.54	-0.99	0.45	-1.44
	(-2.26)	(0.85)	(-2.17)	(-2.21)	(0.83)	(-2.09)
Comp	-0.45	1.06	-1.51	-0.45	1.10	-1.56
	(-0.91)	(2.19)	(-2.43)	(-0.96)	(2.09)	(-2.43)
Ave	-0.45	0.56	-1.02	-0.41	0.61	-1.01
	(-1.55)	(1.91)	(-2.62)	(-1.50)	(1.86)	(-2.59)

Table B.2 (cont.): Excess Returns of Macro-Factor-Beta Sorted Hedge Fund Portfolios: Other Classifications

Panel B: Bali et al. (2014) classification

	Directional			Semi-directional			Non-directional		
	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low
CON	-0.56	-1.28	0.72	-0.34	-0.56	0.22	-0.04	-0.78	0.73
	(-1.18)	(-1.99)	(0.95)	(-0.76)	(-1.27)	(0.37)	(-0.16)	(-2.07)	(1.64)
TFP	-0.45	0.25	-0.70	-0.06	0.58	-0.64	-0.35	1.06	-1.41
	(-0.79)	(0.31)	(-0.78)	(-0.11)	(1.15)	(-0.98)	(-1.15)	(2.66)	(-3.22)
IPG	-0.18	0.81	-1.00	-0.45	0.53	-0.98	-0.13	0.48	-0.62
	(-0.34)	(1.21)	(-1.33)	(-0.91)	(1.62)	(-1.74)	(-0.46)	(2.22)	(-1.70)
TERM	0.16	-0.27	0.43	-0.28	-0.11	-0.17	-0.25	-0.31	0.07
	(0.36)	(-0.35)	(0.51)	(-0.61)	(-0.22)	(-0.27)	(-0.96)	(-0.66)	(0.14)
DEF	0.87	0.47	0.40	-0.33	0.38	-0.71	-0.01	0.57	-0.58
	(1.82)	(0.63)	(0.48)	(-0.62)	(0.71)	(-0.99)	(-0.03)	(1.23)	(-1.18)
UI	0.84	1.11	-0.27	-0.54	0.22	-0.75	-0.31	0.46	-0.77
	(1.75)	(2.06)	(-0.37)	(-1.32)	(0.46)	(-1.28)	(-1.14)	(1.50)	(-1.90)
DEI	0.16	0.70	-0.54	-0.16	0.49	-0.65	-0.34	0.20	-0.54
	(0.27)	(1.16)	(-0.62)	(-0.46)	(1.16)	(-1.22)	(-1.63)	(0.61)	(-1.52)
VOL	-0.46	1.77	-2.23	-0.34	0.95	-1.29	0.16	1.48	-1.32
	(-0.79)	(2.29)	(-2.48)	(-0.91)	(1.74)	(-2.18)	(0.58)	(3.74)	(-2.87)
MKT	0.48	1.97	-1.49	-0.20	1.17	-1.37	-0.32	1.20	-1.53
	(0.68)	(2.11)	(-1.43)	(-0.30)	(1.96)	(-1.70)	(-1.02)	(2.55)	(-2.91)
LAB	0.53	0.34	0.19	-0.47	0.69	-1.16	-0.34	0.32	-0.67
	(0.80)	(0.45)	(0.21)	(-1.05)	(1.89)	(-2.06)	(-1.08)	(0.93)	(-1.39)
Comp	0.19	1.11	-0.92	-0.27	0.84	-1.11	-0.19	0.68	-0.87
	(0.36)	(1.46)	(-1.15)	(-0.70)	(1.97)	(-2.12)	(-0.70)	(1.98)	(-2.16)
Ave	0.14	0.59	-0.45	-0.32	0.43	-0.75	-0.19	0.47	-0.66
	(0.54)	(1.24)	(-0.94)	(-1.39)	(1.47)	(-2.23)	(-1.31)	(2.07)	(-2.75)

Table B.3: Excess Returns of Macro-Factor-Beta Sorted Hedge Fund Portfolios: Alternative Investor Sentiment Measures

This table presents the monthly excess returns of hedge fund portfolios sorted by their exposures to ten macroeconomic risk factors following high and low sentiment months. High- and low-sentiment months are classified based on the median level of the Huang et al. (2015) sentiment index and the Michigan consumer sentiment index. Individual hedge funds are sorted into 10 decile portfolios based on betas w.r.t each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp indicates the portfolios sorted on the composite score across the ten macro-risk betas. Ave indicates the average portfolio across the ten macro-risk-beta sorted portfolios. The monthly return differences between the high-risk and the low-risk portfolios are reported. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

	Huang et al. (2015) sentiment index			Michigan consumer sentiment index		
	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low
CON	-0.88	0.05	-0.94	-0.88	0.12	-1.00
	(-1.47)	(0.19)	(-1.41)	(-1.92)	(0.36)	(-1.94)
TFP	-0.82	0.82	-1.64	-0.51	0.86	-1.37
	(-1.27)	(2.85)	(-2.39)	(-1.11)	(2.42)	(-2.71)
IPG	-0.03	0.40	-0.43	0.01	0.46	-0.45
	(-0.06)	(1.97)	(-0.78)	(0.02)	(2.23)	(-0.94)
TERM	-0.35	-0.10	-0.25	-0.21	-0.22	0.01
	(-0.67)	(-0.34)	(-0.41)	(-0.51)	(-0.64)	(0.02)
DEF	-1.13	0.32	-1.45	-0.63	0.13	-0.76
	(-2.09)	(0.98)	(-2.38)	(-1.40)	(0.38)	(-1.64)
UI	0.26	0.14	0.12	0.44	0.01	0.43
	(0.67)	(0.66)	(0.29)	(1.41)	(0.02)	(1.14)
DEI	0.30	0.37	-0.07	0.64	0.11	0.53
	(0.70)	(1.38)	(-0.14)	(1.78)	(0.41)	(1.33)
VOL	-0.19	0.67	-0.85	-0.05	0.76	-0.81
	(-0.30)	(2.08)	(-1.25)	(-0.10)	(1.93)	(-1.35)
MKT	-0.48	1.04	-1.52	-0.10	0.99	-1.09
	(-0.55)	(2.74)	(-1.60)	(-0.15)	(2.16)	(-1.43)
LAB	-0.60	0.26	-0.86	-0.56	0.52	-1.08
	(-1.01)	(0.90)	(-1.33)	(-1.17)	(1.59)	(-2.03)
Comp	-0.61	0.73	-1.35	-0.26	0.72	-0.98
	(-0.93)	(2.53)	(-1.91)	(-0.52)	(2.15)	(-1.74)
Ave	-0.39	0.40	-0.79	-0.19	0.37	-0.56
	(-0.97)	(2.56)	(-1.88)	(-0.63)	(1.85)	(-1.76)

Table B.4: Macro-Factor-Beta Sorted Hedge Fund Portfolios following High and Low Sentiment: Robustness Tests

This table presents the monthly return differences of high and low macro-beta-sorted hedge fund portfolios following high and low sentiment months. High- and low-sentiment months are classified based on the median level of the BW sentiment index. Individual hedge funds are sorted into 10 decile portfolios based on betas with respect to each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp indicates the portfolios sorted on the composite score across the ten macro-risk betas. Ave indicates the average portfolio across the ten macro-risk-beta sorted portfolios. The monthly return differences between the high-risk and the low-risk portfolios are reported. Results correspond to hedge fund portfolios formed using value-weighting, macro-factor betas estimated by controlling the market factor, and the macro-factor betas as the average of contemporaneous and lagged factor betas, respectively. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

	Value-weighted			Controlling MKTRF			$\beta_t + \beta_{t-1}$		
	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low
CON	-0.39	-0.35	-0.04	-0.16	-0.34	0.18	0.16	0.15	0.01
	(-1.06)	(-0.78)	(-0.07)	(-0.68)	(-1.32)	(0.50)	(0.43)	(0.31)	(0.02)
TFP	0.15	0.50	-0.34	-0.25	0.51	-0.76	-0.33	0.77	-1.10
	(0.33)	(0.98)	(-0.55)	(-0.79)	(1.98)	(-1.98)	(-0.96)	(1.80)	(-2.13)
IPG	-0.31	0.87	-1.18	-0.03	0.32	-0.35	-0.60	-0.39	-0.21
	(-0.99)	(2.28)	(-2.34)	(-0.12)	(1.46)	(-1.15)	(-2.13)	(-1.49)	(-0.55)
TERM	0.08	-0.07	0.15	-0.18	-0.08	-0.10	-0.05	-0.29	0.24
	(0.19)	(-0.16)	(0.27)	(-0.54)	(-0.34)	(-0.25)	(-0.13)	(-0.70)	(0.45)
DEF	-0.61	0.21	-0.82	-0.28	0.33	-0.61	-0.29	0.05	-0.34
	(-1.46)	(0.48)	(-1.44)	(-1.04)	(1.22)	(-1.67)	(-1.00)	(0.11)	(-0.65)
UI	0.02	0.61	-0.59	0.20	0.30	-0.10	0.18	0.47	-0.29
	(0.06)	(1.76)	(-1.33)	(1.11)	(1.32)	(-0.33)	(0.56)	(1.59)	(-0.72)
DEI	-0.22	0.41	-0.63	0.59	0.43	0.16	0.00	0.40	-0.40
	(-0.51)	(0.98)	(-1.05)	(2.54)	(1.69)	(0.48)	(0.01)	(1.19)	(-0.90)
VOL	-0.09	1.26	-1.36	-0.23	0.57	-0.80	-0.32	1.22	-1.55
	(-0.24)	(2.92)	(-2.47)	(-0.88)	(2.05)	(-2.21)	(-0.77)	(2.55)	(-2.71)
MKT	-0.54	1.10	-1.64	-0.41	1.40	-1.81	-0.24	1.48	-1.72
	(-1.02)	(1.87)	(-2.29)	(-0.80)	(2.39)	(-2.60)	(-0.47)	(2.48)	(-2.47)
LAB	-0.59	0.43	-1.02	-0.44	0.06	-0.50	-0.47	0.39	-0.86
	(-1.40)	(0.99)	(-1.77)	(-1.29)	(0.23)	(-1.20)	(-1.36)	(1.26)	(-1.85)
Comp	-0.25	0.84	-1.09	-0.23	0.75	-0.98	-0.18	0.71	-0.89
	(-0.62)	(2.53)	(-2.23)	(-0.68)	(2.44)	(-2.41)	(-0.57)	(1.84)	(-1.98)
Ave	-0.25	0.50	-0.75	-0.12	0.35	-0.47	-0.20	0.42	-0.62
	(-1.14)	(1.77)	(-2.36)	(-0.77)	(2.44)	(-2.46)	(-1.07)	(1.58)	(-2.15)

Table B.5: Macro-Factor-Beta Sorted Hedge Fund Portfolios following High and Low Sentiment: Management Company Level

This table presents the monthly excess returns of hedge fund company portfolios sorted by their exposures to ten macroeconomic risk factors following high and low sentiment months. Monthly returns of a fund management company is the average monthly returns of all its managed funds. High- and low-sentiment months are classified based on the median level of the BW sentiment index. Individual management companies are sorted into 10 decile portfolios based on betas w.r.t each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp indicates the portfolios sorted on the composite score across the ten macro-risk betas. Ave indicates the average portfolio across the ten macro-risk-beta sorted portfolios. The monthly excess returns for the high-risk (Decile 10) and the low-risk (Decile 1) management company portfolios, as well as the return differences between the high-risk and the low-risk portfolios are reported. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

	Low risk			High risk			High risk-Low risk		
	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low
CON	0.15	1.10	-0.95	-0.22	0.74	-0.95	-0.37	-0.36	-0.01
	(0.57)	(3.47)	(-2.29)	(-0.58)	(1.76)	(-1.96)	(-0.96)	(-0.84)	(-0.01)
TFP	0.15	0.52	-0.37	-0.27	1.49	-1.77	-0.43	0.97	-1.40
	(0.88)	(2.01)	(-1.23)	(-0.68)	(3.00)	(-3.11)	(-1.15)	(1.92)	(-2.43)
IPG	-0.02	0.42	-0.44	-0.31	1.34	-1.66	-0.29	0.92	-1.21
	(-0.11)	(1.56)	(-1.43)	(-0.81)	(2.98)	(-3.05)	(-0.87)	(2.70)	(-2.68)
TERM	-0.07	1.18	-1.25	-0.04	0.78	-0.82	0.04	-0.40	0.43
	(-0.23)	(3.78)	(-2.83)	(-0.13)	(1.86)	(-1.78)	(0.10)	(-0.93)	(0.81)
DEF	0.13	0.91	-0.78	-0.31	0.98	-1.29	-0.44	0.06	-0.51
	(0.73)	(3.15)	(-2.23)	(-0.79)	(2.03)	(-2.28)	(-1.33)	(0.12)	(-0.86)
UI	-0.05	0.63	-0.68	0.01	1.24	-1.23	0.05	0.61	-0.55
	(-0.15)	(2.07)	(-1.86)	(0.03)	(3.15)	(-2.74)	(0.21)	(1.80)	(-1.39)
DEI	-0.15	0.74	-0.89	0.02	1.30	-1.28	0.17	0.56	-0.39
	(-0.48)	(2.13)	(-2.19)	(0.07)	(3.38)	(-2.84)	(0.62)	(1.50)	(-0.88)
VOL	0.09	0.26	-0.17	-0.22	1.53	-1.75	-0.30	1.27	-1.58
	(0.49)	(1.67)	(-0.76)	(-0.52)	(2.85)	(-2.82)	(-0.77)	(2.67)	(-2.82)
MKT	0.03	0.15	-0.12	-0.28	1.61	-1.89	-0.32	1.46	-1.77
	(0.23)	(1.18)	(-0.69)	(-0.57)	(2.64)	(-2.68)	(-0.57)	(2.34)	(-2.39)
LAB	0.14	0.60	-0.46	-0.33	1.12	-1.44	-0.47	0.52	-0.98
	(0.48)	(1.93)	(-1.12)	(-0.88)	(2.35)	(-2.68)	(-1.15)	(1.04)	(-1.55)
Comp	0.14	0.35	-0.21	-0.20	1.33	-1.53	-0.34	0.97	-1.32
	(1.10)	(3.55)	(-1.22)	(-0.53)	(2.90)	(-2.88)	(-0.87)	(2.21)	(-2.47)
Ave	0.04	0.65	-0.61	-0.20	1.21	-1.41	-0.24	0.56	-0.80
	(0.21)	(3.23)	(-2.35)	(-0.57)	(2.78)	(-2.85)	(-1.03)	(1.93)	(-2.36)

Table B.6: Macro-Factor-Beta Sorted Equity Mutual Fund Portfolios following High and Low Sentiment: Management Company Level

This table presents the monthly excess returns of equity mutual fund company portfolios sorted by their exposures to ten macroeconomic risk factors following high and low sentiment months. Monthly returns of a fund management company is the average monthly returns of all its managed funds. High- and low-sentiment months are classified based on the median level of the BW sentiment index. Individual management companies are sorted into 10 decile portfolios based on betas with respect to each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp indicates the portfolios sorted on the composite score across the ten macro-risk betas. Ave indicates the average portfolio across the ten macro-risk-beta sorted portfolios. The monthly excess returns for the high-risk (Decile 10) and the low-risk (Decile 1) management company portfolios, as well as the return differences between the high-risk and the low-risk portfolios are reported. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

	Low risk			High risk			High risk-Low risk		
	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low	High sent.	Low sent.	High -Low
CON	0.27	0.59	-0.32	-0.10	0.94	-1.04	-0.37	0.35	-0.73
	(0.87)	(1.45)	(-0.70)	(-0.22)	(1.58)	(-1.57)	(-1.10)	(1.02)	(-1.65)
TFP	0.37	0.46	-0.09	-0.22	0.96	-1.18	-0.59	0.50	-1.09
	(1.32)	(1.22)	(-0.22)	(-0.45)	(1.69)	(-1.80)	(-1.74)	(2.03)	(-2.83)
IPG	0.30	0.53	-0.24	-0.05	0.81	-0.86	-0.35	0.28	-0.63
	(0.90)	(1.01)	(-0.44)	(-0.11)	(1.64)	(-1.43)	(-1.15)	(1.01)	(-1.68)
TERM	0.25	0.87	-0.62	-0.03	0.58	-0.61	-0.27	-0.29	0.01
	(0.61)	(1.80)	(-1.07)	(-0.07)	(1.20)	(-1.13)	(-0.77)	(-1.30)	(0.03)
DEF	0.30	1.00	-0.70	-0.19	0.53	-0.72	-0.50	-0.47	-0.02
	(0.93)	(2.23)	(-1.35)	(-0.43)	(1.02)	(-1.19)	(-1.75)	(-1.59)	(-0.06)
UI	0.24	0.85	-0.60	-0.10	0.55	-0.65	-0.34	-0.30	-0.05
	(0.63)	(1.58)	(-1.07)	(-0.26)	(1.20)	(-1.21)	(-1.67)	(-1.30)	(-0.16)
DEI	0.12	0.65	-0.53	-0.03	0.77	-0.81	-0.16	0.13	-0.28
	(0.33)	(1.25)	(-0.94)	(-0.09)	(1.60)	(-1.47)	(-0.72)	(0.42)	(-0.80)
VOL	0.22	0.50	-0.28	-0.14	0.97	-1.11	-0.35	0.48	-0.83
	(0.83)	(1.31)	(-0.69)	(-0.28)	(1.73)	(-1.69)	(-1.27)	(2.02)	(-2.47)
MKT	0.27	0.36	-0.10	-0.21	1.10	-1.32	-0.48	0.74	-1.22
	(1.24)	(1.14)	(-0.28)	(-0.39)	(1.80)	(-1.80)	(-1.14)	(2.09)	(-2.40)
LAB	0.44	0.68	-0.23	-0.28	0.80	-1.08	-0.72	0.12	-0.84
	(1.46)	(1.64)	(-0.50)	(-0.58)	(1.44)	(-1.66)	(-2.23)	(0.40)	(-1.91)
Comp	0.34	0.55	-0.21	-0.17	0.95	-1.12	-0.51	0.40	-0.91
	(1.27)	(1.51)	(-0.52)	(-0.35)	(1.71)	(-1.73)	(-1.47)	(1.64)	(-2.35)
Ave	0.28	0.65	-0.37	-0.14	0.80	-0.94	-0.41	0.15	-0.57
	(0.91)	(1.53)	(-0.80)	(-0.30)	(1.54)	(-1.56)	(-1.74)	(1.35)	(-2.32)

Table B.7: Macro-Factor-Beta Sorted Hedge Fund Portfolios Conditional on NBER Recessions

This table presents the monthly excess returns of hedge fund portfolios sorted by their exposures to ten macroeconomic risk factors conditional on macroeconomic conditions. NBER recession months are classified according to the National Bureau of Economic Research. Individual hedge funds are sorted into 10 decile portfolios based on betas w.r.t each of ten macroeconomic risk measures. Betas are estimated using a 24-month rolling-window with a minimum observation requirement of 18 months. Comp indicates the portfolios sorted on the composite score across the ten macro-risk betas. Ave indicates the average portfolio across the ten macro-risk-beta sorted portfolios. The monthly excess returns for the high-risk (Decile 10) and the low-risk (Decile 1) hedge fund portfolios, as well as the return differences between the high-risk and the low risk portfolios are reported. The Newey-West three-lag adjusted t-statistics are reported in parentheses. The sample period is from 1997/1 to 2017/12.

	Low risk			High risk			High risk-Low risk		
	Rec.	Non-rec.	Rec. - Non-rec.	Rec.	Non-rec.	Rec. - Non-rec.	Rec.	Non-rec.	Rec. - Non-rec.
CON	0.33	0.58	-0.25	-1.43	0.38	-1.81	-1.76	-0.20	-1.56
	(0.33)	(2.71)	(-0.24)	(-0.98)	(1.35)	(-1.21)	(-1.70)	(-0.69)	(-1.47)
TFP	0.34	0.29	0.05	-1.56	0.73	-2.29	-1.90	0.44	-2.34
	(1.84)	(1.70)	(0.19)	(-0.83)	(2.36)	(-1.20)	(-1.06)	(1.63)	(-1.29)
IPG	-0.39	0.26	-0.65	-0.99	0.60	-1.59	-0.60	0.34	-0.94
	(-0.52)	(1.60)	(-0.85)	(-0.58)	(2.10)	(-0.92)	(-0.57)	(1.40)	(-0.86)
TERM	0.48	0.42	0.06	-0.89	0.34	-1.23	-1.37	-0.07	-1.29
	(1.15)	(1.50)	(0.12)	(-0.51)	(1.60)	(-0.70)	(-0.93)	(-0.29)	(-0.87)
DEF	-0.11	0.50	-0.61	-1.34	0.37	-1.71	-1.23	-0.13	-1.11
	(-0.53)	(2.69)	(-2.18)	(-0.72)	(1.26)	(-0.90)	(-0.70)	(-0.48)	(-0.62)
UI	-1.13	0.43	-1.56	-0.35	0.58	-0.93	0.78	0.15	0.63
	(-1.00)	(1.96)	(-1.35)	(-0.29)	(2.48)	(-0.75)	(1.00)	(0.75)	(0.78)
DEI	-1.57	0.39	-1.96	0.13	0.60	-0.47	1.70	0.21	1.49
	(-1.53)	(1.72)	(-1.87)	(0.10)	(2.57)	(-0.37)	(1.59)	(0.97)	(1.37)
VOL	0.11	0.21	-0.1	-1.10	0.76	-1.86	-1.21	0.55	-1.77
	(0.28)	(1.62)	(-0.23)	(-0.59)	(2.34)	(-0.98)	(-0.78)	(1.87)	(-1.11)
MKT	0.29	0.06	0.22	-1.16	0.75	-1.91	-1.45	0.69	-2.14
	(0.96)	(0.66)	(0.68)	(-0.57)	(2.04)	(-0.91)	(-0.76)	(1.78)	(-1.07)
LAB	-0.18	0.37	-0.55	-1.23	0.48	-1.71	-1.05	0.11	-1.16
	(-0.45)	(1.64)	(-1.20)	(-0.65)	(1.70)	(-0.89)	(-0.65)	(0.38)	(-0.70)
Comp	-0.03	0.27	-0.3	-1.26	0.68	-1.94	-1.23	0.41	-1.64
	(-0.19)	(3.37)	(-1.53)	(-0.71)	(2.40)	(-1.08)	(-0.70)	(1.47)	(-0.91)
Ave	-0.18	0.35	-0.53	-0.99	0.56	-1.55	-0.81	0.21	-1.02
	(-0.35)	(2.28)	(-0.99)	(-0.60)	(2.13)	(-0.92)	(-0.68)	(1.32)	(-0.83)