Noise Trader Risk and Hedge Fund Returns

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Abstract

This paper documents a new and important cross-sectional determinant of hedge fund expected returns, their exposures to noise trader risk, measured as beta of fund returns with respect to unexpected change in investor sentiment. Using the Baker and Wurgler (2007) index as the sentiment proxy, and for a comprehensive sample of equity-oriented hedge funds over the period 1994-2010, we find strong evidence that, on average, hedge funds with higher sentiment beta subsequently outperform those with lower sentiment beta by about 0.6% per month. The difference in the average returns increases to about 0.82% after controlling for risk factors identified in existing studies. Our findings suggest that noise trader risk is priced in hedge funds.

Keywords: Hedge funds, investor sentiment, sentiment risk, fund returns

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1. Introduction

Hedge funds have become an important investment vehicle in financial markets. During the past two decades, the hedge fund industry experienced dramatic growth in both number of funds and assets under management.[1] One of the main reasons for the fast growth of hedge funds is their superior performance. The academic literature has generally documented significant alpha delivered by hedge funds, and superior performance by top hedge funds cannot be explained by pure luck.[2] Understanding the source of this superior performance by hedge funds is an important motivation for our paper.

A common belief is that hedge funds are smart money and able to take advantage of the mispricing caused by noise traders. However, as pointed out by the seminal work of Delong, Shleifer, Summers, and Waldmann (1990), the sentiment of noise traders can become more extreme and prices may move even further away from fundamental value after security prices deviate from true economic value. Our paper uses a comprehensive sample of equity-oriented hedge funds over the period 1994-2010 to test whether noise trader risk is priced and whether exposure to the fluctuations in investor sentiment can explain part of hedge funds' superior performance.

To understand the returns of hedge funds, the existing studies have so far focused on their exposures to a wide range of risk factors, including equity factors (market risk, size factor, liquidity risk), interest rate-related factors (term premium and credit spread), options-related trend-following factors, as well as macroeconomic risk factors (e.g., inflation and default premium).[3]

[1] According to Lipper TASS, the hedge fund industry has evolved from a few hundred funds managing less than $50 billion in the early 1990s to over 9,000 funds managing more than $2 trillion by the end of 2010.
[2] See e.g., Ackermann, McEnally, and Ravenscraft (1999), Brown, Goetzmann, and Ibbotson (1999), Liang (1999), Kosowski, Naik, and Teo (2007), Fung, Hsieh, Naik, and Ramadorai (2008), Titman and Tiu (2011).
[3] See, e.g., Fung and Hsieh (1997, 2001, 2004), Asness, Krail, and Liew (2001), Mitchell and Pulvino (2001), Agarwal and Naik (2004), Getmansky, Lo,and Marakov (2004), Sadka (2010), Bali, Brown, and Caglayan (2011, 2012, 2013), and Teo (2011).

We find that even after controlling for these rational risk factors, hedge funds' exposures to sentiment risk are significantly and positively related to their expected returns. We measure sentiment risk as the unexpected changes in investor sentiment proxied by the Baker and Wurgler (2007) sentiment index, i.e., changes in the residuals of the Baker and Wugler index regressed on a set of pre-determined macroeconomic variables.

Each month, we first run a time-series regression of a given hedge fund's returns over the previous 36 months on the sentiment risk factor (while controlling for risk factors identified in previous studies for hedge funds), and use the regression coefficient as the fund's sentiment beta for that month. Then, we examine the cross-sectional relation between sentiment beta and future hedge fund return using both portfolio sorts and the Fama-MacBeth (1973) cross-sectional regressions. For example, when we sort hedge funds into 10 portfolios based on their sentiment beta, the top sentiment-beta decile on average outperforms the bottom decile by about 0.6% next month. After controlling for the Fung and Hsieh (2004) seven factors, liquidity factor, momentum, inflation rates and default spreads (Bali, Brown, and Caglayan (2011)), the spread of alpha between a portfolio of high sentiment-beta funds and a portfolio of low sentiment-beta funds becomes even larger, at 0.82% per month. Our results suggest that sentiment beta is an important factor determining the cross-section of hedge fund returns, above and beyond their exposures to rational and macroeconomic risk factors.

A large literature in equity research has studied whether the *level* of investor sentiment can predict asset returns (time-series tests), or whether sentiment can serve as a useful *conditioning variable* in cross-sectional asset pricing tests (e.g., Delong, Shleifer, Summers and Waldmann (1990), Lee, Shleifer, and Thaler (1991), Elton, Gruber and Busse (1998), Brown, Goetzmann, Hiraki, Shiraishi, and Watanabe (2003), Lemmon and Portniaguina (2006), Baker

and Wurgler (2006, 2007), and Stambaugh, Yu, and Yuan (2012)). However, the literature still has not reached a consensus about the role of investor sentiment in asset returns. More importantly, the literature has ignored the potential important role of *sentiment beta* (as opposed to sentiment level). The only exception we are aware of is Glushkov (2005), who fails to find support for the hypothesis that stocks with greater exposures to sentiment risk earn higher returns. In fact, he reports an inverse U-shape relationship between sentiment beta and stock return: stocks with extreme values of sentiment beta earn lower future returns relative to their near-zero sentiment beta counterparts. Our paper is the first to investigate the pricing of noise trader risk using hedge funds, the group of investors who are most exposed to noise trader risk.

Since we focus on equity hedge funds, the impact of sentiment beta on stock returns, if significant, would naturally disseminate into hedge fund returns. Unlike Glushkov (2005) whose sample period is 1975-2003, we find that for our 1994-2010 sample, sentiment beta significantly spreads stock returns. However, this does not drive our finding for hedge fund returns. After we control for the top-minus-bottom spread portfolio of stocks sorted by their sentiment beta, the top-minus-bottom sentiment-beta sorted hedge fund portfolio still has a significant positive alpha and its magnitude is barely changed. This suggests that high sentiment-beta hedge funds do not earn significantly higher returns because they hold more stocks with higher sentiment beta.

Interestingly, the most significant determinants of hedge fund's sentiment beta are a collection of variables that are typically viewed as proxies of managerial skill. More skilled hedge funds, such as those with high watermark, high incentive fee, high management fee, high minimum investment and longer lockup period, tend to have significantly lower sentiment beta. Other fund characteristics such as fund age, fund flows and past returns are not significantly related to their sentiment beta. Thus, while higher exposure to sentiment risk commands higher expected

return, the more skilled hedge funds tend to have low exposures to the sentiment risk, perhaps because they are better at timing investor sentiment and can establish arbitrage positions at the right moment (just as excessive sentiment and hence mispricing are about to get corrected).

We verify that even after controlling for fund characteristics that are both related to fund returns and sentiment beta, on the margin, there is still a significantly positive relation between sentiment beta and fund return. This effect is economically significant as well. Based on the regression coefficient, a one-standard deviation increase in sentiment beta is associated with about 0.2% higher fund return per month.

We conduct additional analysis to gain further insights about the role of sentiment risk in explaining hedge fund returns. First, we examine the returns to the high-minus-low sentiment-beta portfolio for different holding periods, ranging from one to twelve months. We find that the average return of the spread portfolio declines with the holding period, suggesting that the outperformance of high sentiment beta funds is concentrated in the near future. For example, the high sentiment beta funds on average earn 0.54% (resp. 0.43% and 0.29%) higher returns per month over the next 3 months (resp. 6 months and 12 months). This is consistent with the time variation in hedge fund's sentiment beta, which could result from the dynamic nature of hedge fund trading strategies. We find that only about 60% (resp. 50%) of the hedge funds currently ranked in the top decile by sentiment beta still remains in the top decile after 6 months (resp. 12 months).

Second, we analyze the effect of sentiment beta among different investment styles of hedge funds. Our results are significant mainly for the directional funds (emerging market, global macro and long/short equity) and multi-strategy funds, but not significant at all for non-directional funds (such as event driven, equity market neutral strategies) or funds of hedge funds.

Third, we examine the interaction of sentiment beta and the level of investor sentiment. Our results are robust across both high and low sentiment periods. Sentiment beta is a significant determinant of hedge funds expected return both when the current investor sentiment is high and when it is low. The magnitude of the sentiment-beta effect is about the same across high and low sentiment periods. The stable price of noise trader risk for hedge funds contrasts with recent findings that many anomalies are mostly profitable only when the initial level of investor sentiment is high (e.g., Stambaugh, Yu, and Yuan (2012)). This comparison highlights the fact that our results manifest compensation for a risk induced by the noise traders. The sorts on sentiment beta do not seem to be picking up mispricing per se.

Our results contribute to a better understanding of how investor sentiment affects asset returns. We are the first to document that a non-fundamental risk, noise trader risk or fluctuation in investor sentiment, is a priced factor for hedge funds. High sentiment-beta hedge funds on average earn significantly larger returns than low sentiment-beta funds. Our findings suggest another systematic risk to control for when researchers evaluate hedge fund abnormal performance.

Our study also contributes to an on-going debate of fund alpha versus beta, i.e. the manager's ability versus systematic risk exposure. Titman and Tiu (2011) find that hedge funds with lower exposures to systematic factors have higher alpha. Consistent with and adding to this result, we find that more skillful hedge fund managers have lower exposures to the noise trader risk. Some of hedge funds' abnormal returns documented in previous studies may be compensation for a missing risk factor, the noise trader risk, rather than due to the ability to identify mispriced

securities or to time market. This lends support to Cochrane (2011) who argues that the previously documented alpha may be attributed to "exotic beta".[4]

The rest of this paper is organized as follows. Section 2 provides a review of the related literature. Section 3 describes the data used in this paper. Section 4 reports the main findings about the relation between sentiment beta and hedge fund returns. We present additional tests section 5. Finally, section 6 concludes.

2. Literature Review

Our empirical study is motivated by several theoretical papers which suggest that sentiment risk may be priced. In DeLong et al. (1990), sentiment is a general tendency to speculate. It can cause security prices to temporarily deviate from true economic values. Arbitrageurs who bet against mispricing run into the risk that sentiment becomes more extreme and prices move even further away from fundamental value. Hence, the fluctuation of investor sentiment could be a source of systematic risk generated by the very existence of an asset market.

In Dumas, Kurshev, and Uppal (2009), a subpopulation of investors is overconfident. Sentiment is the difference between overconfident investors' probability belief and that of the rational investors. If there is a difference of opinion today, investors with the proper beliefs are aware that the overconfident investors will revise their probability beliefs differently from the way their own will be revised. Hence the difference of opinion drives sentiment, which is stochastic. When such dispersion in belief enters into the state price density, sentiment risk carries a risk premium.

[4] Cochrane (2011, p.1087) argues that "there is no 'alpha.' There is just beta you understand and beta you do not understand."

Han (2008) provides an empirical motivation to test whether sensitivity to the sentiment factor is significantly related to the cross-section of hedge fund expected return. It is well known that index option prices can be used to estimate the Arrow-Drebreu state prices or the asset pricing kernel (e.g., Breeden and Litzenberger (1978)). Han (2008) shows that investor sentiment significantly affects S&P500 index option prices and hence the pricing kernel. Given pricing kernel depends on investor sentiment, the fundamental theorem of asset pricing implies that the expected returns of risky assets should be related to their covariances with the sentiment factor.

Direct empirical evidence on whether sentiment risk is priced is sparse. Most previous studies have focused on finding a suitable measure of investor sentiment and examine whether it is related to the returns of the aggregate market or various portfolios. One exception is Brown, Goetzmann, Hiraki, Shirishi and Watanabe (2003) who use daily mutual fund flows to construct an investor sentiment index, and find that the exposure to the index is significantly and positively priced in daily mutual fund returns in both the U.S and Japanese markets. To our knowledge, there is no previous research examining investor sentiment as a potential systematic risk factor in hedge funds. Compared to mutual funds, hedge funds tend to hold smaller stocks and stocks with higher momentum which are most likely to be affected by market-wide sentiment (e.g. Griffin and Xu (2009)).

Although previous studies on investor sentiment rarely examine whether exposures to change in investor sentiment spread the cross-section of asset returns, they provide empirical evidence that investor sentiment can have pervasive effects on asset prices. For example, Barber, Odean, and Zhu (2009) document that noise trading is systematic and psychological biases contribute to correlated trading of retail investors. Lemmon and Portniaguina (2006) present evidence that their measure of sentiment based on consumer confidence indices negatively predicts

the future returns of small stocks. Baker and Wugler (2006) find that sentiment affects stocks of similar characteristics in similar ways (i.e., the effect of sentiment works at "style" level).[5] To the extent that investor sentiment influences sufficiently many securities in the same direction and at the same time, the risk arising from investor sentiment is non-diversifiable and may be priced in equilibrium.

In another related study, Sias, Starks, and Tinic (2001) find closed-end fund shareholders do not gain higher returns than holders of underlying assets. Before interpreting this as evidence that there is no compensation for bearing "noise trader risk", one should keep in mind the debates about whether closed-end fund discount is a good proxy for investor sentiment (e.g, Chen, Kan and Miller (1993)). To test whether sentiment risk is priced, it is important to use a reliable proxy for investor sentiment. We follow several recent papers and adopt the influential Baker and Wurgler (2007) sentiment index.[6] The sentiment index is the first principal component of the following six proxies related to behavioral biases: closed-end fund discount, market turnover, number of IPOs, average first day return on IPOs, equity share of new issuances, and the log difference in book-to-market ratios between dividend payers and dividend non-payers.

Our paper is related to a growing literature on the risk-return relation in the hedge fund industry (e.g., Fung and Hsieh (1997, 2001, 2004), Ackermann, McEnally, and Ravenscraft (1999), Brown, Goetzmann, and Ibbotson (1999), Liang (1999), Agarwal and Naik (2000, 2004)). In particular, Fung and Hsieh (2004) propose a seven-factor model and show it can explain time series variations in hedge fund returns. Sadka (2010) and Teo (2011) show that liquidity risk can

[5] For example, when beginning-of-period proxies for sentiment are low, subsequent return are relatively high for small stocks, young stocks, high volatility stocks, unprofitable stocks, non-dividend-paying stocks, extreme growth stocks, and distressed stocks.

[6] For example, Baker, Wurgler and Yuan (2012), Stambaugh, Yu and Yuan (2012), Yu and Yuan (2011), and Yu (2013).

help to explain the cross-section of hedge fund returns, especially for those funds that impose less strict redemption restrictions. Bali, Brown, and Caglayan (2011) show that default premium beta and inflation beta significantly predict hedge funds' future returns. Bali, Brown, and Caglayan (2012) find that several comprehensive measures of systematic risk have significant explanatory power for the dispersion of the cross-sectional hedge fund returns. Recently, Bali, Brown, and Caglayan (2013) show that hedged funds' exposures to macroeconomic uncertainty are positively related to future hedge fund returns. Finally, Patton and Ramadorai (2013) find that hedge fund risk exposure varies significantly over time. Cao, Chen, Liang, and Lo (2013) document that hedge fund's market risk varies with aggregated market liquidity conditions.

3. Data

We use five sources of data to study the role of sentiment risk in explaining hedge fund returns. First, the Lipper TASS hedge-fund database provides information about hedge funds returns and fund characteristics. TASS covers both active and defunct hedge funds since 1994. The hedge fund literature has identified several biases associated with hedge-fund databases, such as survivorship bias and backfilling bias. Section 3.1 explains the method we adopt to minimize the impact of these biases in detail. Second, we adopt the Baker and Wurgler (2007) monthly market-wide sentiment index to proxy for the aggregate investor sentiment. Third, we include the Fung and Hsieh (2004) seven factors and macroeconomic variables (e.g., Bali, Brown, and Caglayan (2011)) in our benchmark model to control for funds' exposures to systematic risk factors already studied in the literature. Fourth, we use the Pastor and Stambaugh (2003) aggregate monthly liquidity measure to control for liquidity risk exposure of hedge funds. Finally, we obtain monthly stock returns from the Center for Research on Security Prices

(CRSP). Following a common practice, we restrict the sample to common stocks listed at NYSE, AMEX, and NASDAQ. Our sample period spans from January 1994 to December 2010.

3.1 Hedge fund data

Individual hedge funds in TASS are classified into 11 categories according to their primary investment strategies: convertible arbitrage, dedicated short bias, event driven, emerging markets, equity market neutral, fixed income arbitrage, funds of funds, global macro, long-short equity, managed futures, and multi-strategy. Our study focuses on equity-oriented hedge funds.[7] We exclude the strategies of fixed income arbitrage and managed futures. We also remove dedicated short bias hedge funds from our analysis because this category contains too few individual funds. Thus, there are eight categories of funds remaining in our sample.

Following prior research, we use monthly net-of-fee returns for both live and defunct hedge funds. TASS reports all the returns based on US dollar. The inclusion of defunct funds mitigates the impact of survivorship bias. To address the concerns that database vendors may backfill funds' performance when new funds are added, we exclude the first 12 months of return data for each fund. Only funds that report their net of all fees (management fee, incentive fee, and other expenses) returns on a monthly basis and allow for redemption at a monthly or higher frequency are kept in our sample.[8] Finally, we require funds have assets under management

[7] Similarly, Agarwal and Naik (2004) focus only on equity-oriented hedge funds when studying the effect of equity-option factors on hedge fund returns. Note that over 80% of hedge funds in TASS data are equity-oriented hedge funds.

[8] Teo (2011) classifies hedge funds allowing for monthly redemptions or better as funds granting favorable redemption terms. Aragon (2007) finds a positive relationship between the hedge funds' use of redemption restrictions and the illiquidity of the underlining assets. Thus, hedge funds in our sample hold relatively liquid assets.

(AUM) of at least $5 million.[9] Given these filters, there are 5842 unique equity hedge funds in our sample. The top one percent of returns is winsorized to prevent outliers from affecting our analysis.

[Insert Table 1 about here.]

Table 1 reports descriptive statistics of hedge fund excess return (in excess of one-month T-bill rate). Panel A shows that the number of hedge fund increases rapidly from 138 in 1994 to 2968 in 2008 and then declines to 2079 in 2010 after the recent financial crisis. The average monthly excess return ranges from a low of -1.75% in 2008 to a high of 1.76% in 1999. During our sample period, hedge funds earn the highest returns in 1999, the peak of tech bubble. They experience the lowest returns in 2008 during the financial crisis. Panel B reports the summary statistics by investment style. Across the different styles of funds we study, emerging market funds have the highest monthly excess return of 0.79% during our sample period, while funds of funds have the lowest average excess return of 0.19% per month.

Table 2 reports the summary statistics of fund characteristics including management fee, incentive fee, minimum investment amount, fund size, lockup period, total redemption notice period, and whether the fund has a high water mark. These summary statistics are similar to and comparable with those in the previous studies that use the TASS data on hedge funds. There is no obvious selection bias in our sample of hedge funds.

[Insert Table 2 about here.]

[9] Our results are robust when we exclude funds with AUM under $10 million or the first 24 months of fund returns in the TASS database.

3.2 Investor sentiment measure

To proxy for the aggregate investor sentiment, we adopt the Baker and Wurgler (2007) monthly market-wide sentiment index. The index starts from July 1965, and derives from six proxies of investor sentiment: closed-end fund discount, the number and the first-day returns of IPO's, NYSE turnover, the equity share in total new issues, and the dividend premium. To remove the potential impacts of business cycle on these six sentiment proxies, Baker and Wurgler regress each of six proxies on a set of measures for the economics cycles and use the residuals from the regressions as the orthogonalized proxies for sentiment. The sentiment-change index is the first principal component of changes in six orthogonalized sentiment proxies. Throughout this paper, our empirical tests use the investor sentiment-change index as the sentiment factor.

[Insert Figure 1 about here.]

Figure 1 plots the Baker and Wurgler (2007) sentiment-change index over our sample period from January 1994 to December 2010. This sentiment factor is highly volatile, ranging from a low value of about -3 to a high value of around 3. The standard deviation of the monthly sentiment factor is 1.11. By construction, the mean and median of the sentiment factor are both about zero. The distribution of the sentiment factor is symmetric around zero, with the 25 percentile (resp. 75 percentile) being -0.66 (resp. 0.65).

3.3 Additional risk factors

In addition to the sentiment risk, we include various factors known to affect the risk exposures and expected returns of hedge funds (e.g. Fung and Hsieh (2004), Bali, Brown, Caglayan (2011), Teo (2011)).

First, we control for the seven factors proposed in Fung and Hsieh (2004): equity market factor (MKT-RF) and the size factor (SMB), the change in the constant maturity yield of the ten-year Treasury (YLDCHG), the change in the spread between Moody's Baa yield and the ten-year Treasury (BAAMTSY), and three trend-following factors for bonds (PTFSBD), for currency (PTFSFX), and for commodities (PTFSCOM). Since two of the factors, YLDCHG and BAAMTSY, are non-traded factors, one cannot interpret the regression intercept as alpha. To calculate alphas, we replace these two factors by returns of tradable factor mimicking portfolios. Specially, we use the spread between 10-Year Treasury Constant Maturity Rate and risk free rate (ΔTerm) to mimic the change in term spread, and use the spread between Barclays Corporate Bond Baa Index and 10-Year Treasury Constant Maturity Rate (ΔCredit) to proxy the change in credit spread. Many recent studies use the Fung-Hsieh seven-factor model to examine hedge fund performance (e.g., Kosowski, Naik, and Teo (2007), Titman and Tiu (2011)).

Motivated by Bali, Brown, and Caglayan (2011), we control for the inflation risk and default risk (proxied by the spread between the yields on the BAA-rated and AAA-rated corporate bonds) that they show are related to hedge fund returns. We also control for the Carhart (1997) momentum factor, and finally we use the Pastor and Stambaugh (2003) aggregate monthly liquidity measure to control for the liquidity risk.

[Insert Table 3 about here.]

Panel A in Table 3 reports the summary statistics of these risk factors. Panel B presents the correlation matrix of sentiment risk factor and other factors. The main take-away is that sentiment risk does not significantly co-vary with any of the other factors. The factors that are most correlated with sentiment are equity market factor and size factor. The correlations are 0.33 and 0.34 respectively. Investor sentiment tends to increase when the stock market performs well, es-

pecially when small cap stocks outperform large cap stocks. Based on these positive correlations, we expect that if sentiment factor is priced, it would carry a positive risk premium. The only other factor whose correlation with sentiment is larger than 0.1 in magnitude is the inflation risk.

4. Main Results

4.1 Sentiment risk sorted portfolios

We start the analysis of hedge-fund returns and sentiment risk using portfolio sorts. Every month, starting from January 1997, we form ten equal-weighted hedge fund portfolios based on their loadings on the sentiment factor. The hedge fund portfolios are rebalanced every month. The sentiment loading of each fund is calculated each month by regressing the fund's monthly excess return on the sentiment risk factor, controlling for the Fung and Hsieh (2004) seven-factors, the Carhart (1997) momentum factor, and Pastor and Stambaugh (2003) liquidity factor. For each hedge fund with at least 30 non-missing returns observations over the prior 36 months, we estimate the following model using the past 36-month rolling window.

$$\text{Excess return}_{i,t} = \alpha + \beta_0 \text{Sentiment}_t + \beta_1 \text{Mktrf}_t + \beta_2 \text{Liquidity}_t + \beta_3 \text{Smb}_t + \beta_4 \text{Umd}_t + \beta_5 \text{Ptfsbd}_t + \beta_6 \text{Ptfsfx}_t + \beta_7 \text{Ptfscom}_t + \beta_8 \Delta\text{Term}_t + \beta_9 \Delta\text{Credit}_t \quad (1)$$

where i=1, 2…N funds, t=1…T months, β_0 is the sentiment risk loading of fund i. The 36-month rolling window provides sufficient observations to estimate the sentiment risk loading while allowing for time variation in the sentiment beta.

Portfolio formation therefore begins January 1997 and ends December 2010 (168 monthly observations). We then evaluate the performance of each of the ten portfolios by regressing the monthly portfolio returns on the Fung and Hsieh (2004) seven factors, the momentum factor, and the liquidity risk factor. The intercept of this regression is alpha. The difference in the alpha of the high sentiment beta funds (portfolio 10) and that of the low sentiment beta funds (portfolio 1) represents the dispersion in expected returns as a result of hedge funds' differential exposures to the sentiment risk that is not accounted for by exposures to other factors.

[Insert Table 4 about here.]

We report the excess return and alpha for each portfolio in Table 4. Throughout the paper, we base statistical inference on White (1980) heteroskedasticity-consistent standard errors unless otherwise indicated. Table 4 Panel A shows an economically and statistically significant spread in the excess returns between portfolio 10 (high sentiment beta hedge funds) and portfolio 1, (low sentiment beta hedge funds) at 0.62% per month (t-statistic=3.49). After controlling for the Fung and Hsieh (2004) seven-factors, the momentum factor, and the liquidity risk factor, the spread between portfolio 10 and portfolio 1 becomes even more significant, both economically and statistically, at 0.99% per month with a t-statistic of 3.67. The t-statistics are high, given our sample period of 14 years. These results suggest that hedge funds with higher sentiment risk exposure earn a significant positive return premium and outperform hedge funds with low sentiment risk exposure.

In Table 4 Panel B, we redo the portfolio sorting exercise by adding two risk factors, default spreads and inflation rates, to the right hand side of model (1) when estimating the sentiment beta. This is motivated by Bali, Brown, and Caglayan (2011) who find that among 15 financial and macroeconomic risk factors they tested, betas with respect to these two factors are

significantly related to the cross-section of hedge fund returns. Table 4 Panel B shows that our results are not explained by default beta and inflation beta. The raw mean return difference in the high versus low sentiment beta hedge funds is 0.59% per month, and the alpha is 0.82%. Both numbers are slightly reduced compared to Table 4 Panel A (not controlling for default and inflation risks), but are still significant, economically as well as statistically.

It is not surprising that default and inflation risks do not explain our results for the sentiment risk. Table 3 Panel B shows that default risk is not significantly correlated with the sentiment factor. Although the inflation risk is positively correlated with sentiment (correlation=0.28), inflation beta is negatively related to the hedge fund returns (Bali, Brown, and Caglayan (2011)), and thus cannot explain the positive relation between sentiment beta and hedge fund returns.

4.2 Determinants of hedge fund sentiment beta

Given the significant relationship between hedge fund expected return and sentiment risk exposure, it is useful to know what determines fund's sentiment beta. In Table 5, we run cross-sectional regressions of hedge fund's sentiment beta on several fund characteristics. The most significant determinants of hedge fund's sentiment beta are a collection of variables that are typically viewed as proxies of managerial skill. More skilled hedge funds, such as those with high watermark, high incentive fee, high management fee, high minimum investment and long lockup period, tend to have significantly lower sentiment beta.[10] Other fund characteristics such as fund age and fund flows are not significantly related to their sentiment beta.

[10] Redemption notice period, also indicating a fund's redemption restriction, shows a positive association with the funds' sentiment beta, which is the opposite of the relation between lockup period and sentiment beta. Thus, the combined effect of redemption restriction (lockup and notice periods) on sentiment beta seems small.

Our result is important for understanding the source of hedge fund performance. Some funds maintain large exposures to noise trader risk, and earn a higher return on average as a result of bearing noise trader risk. On the other hand, the more skilled hedge funds tend to operate with low exposures to noise trader risk. Their superior performance is likely due to their ability to time shifts in investor sentiment and take advantage of market mispricing when the mispricing is about to get corrected.

[Insert Table 5 about here.]

4.3 Cross-sectional regressions of hedge fund returns

To control for fund characteristics that may affect both fund performance and their sentiment beta, we run the Fama-MacBeth (1973) regressions of monthly hedge fund returns or alphas on funds' sentiment beta, controlling for fund characteristics and investment styles.

We first calculate monthly fund risk-adjusted return relative to the Fung and Hsieh (2004) seven-factor, the Carhart (1997) momentum factor, and Pastor and Stambaugh (2003) liquidity risk factor for each hedge fund with at least 36 months return observations. Hence,

$$\text{Alpha}_{i,t} = \text{Excess return}_{i,t} - (\beta_1 \text{Mktrf}_t + \beta_2 \text{Liquidity}_t + \beta_3 \text{Smb}_t + \beta_4 \text{Umd}_t + \beta_5 \text{Ptfsbd}_t + \beta_6 \text{Ptfsfx}_t + \beta_7 \text{Ptfscom}_t + \beta_8 \Delta\text{Term}_t + \beta_9 \Delta\text{Credit}_t), \quad (2)$$

where i=1, 2…N funds, t=1…T months, $\text{Alpha}_{i,t}$ is the risk-adjusted return of fund i for month t, and $\text{Excess return}_{i,t}$ is fund return in excess of the risk-free rate.

Next, we estimate the following Fama-MacBeth cross-sectional regression for monthly hedge fund alphas (as well as excess returns as the dependent variable):

$$\text{Alpha}_{i,t} = \gamma_0 + \gamma_1 \text{Sentiment Beta}_{i,t-1} + \gamma_2 \text{Management fee}_{i,t} + \gamma_3 \text{Incentive fee}_{i,t} + \gamma_4 \text{Minimum Investment}_{i,t} + \gamma_5 \log(\text{Age})_{i,t-1} + \gamma_6 \log(\text{fund size})_{i,t-1} + \gamma_7 \text{Lockup}_{i,t} + \gamma_8 \text{Notice}_{i,t} + \gamma_{10} \text{High Water Mark}_{i,t} + \sum_{i=11}^{17} \gamma_i \text{ Style Dummies}_{i,t} + \varepsilon_{i,t}\,, \quad (3)$$

where $\text{Sentiment Beta}_{i,t-1}$ is β_0 of fund i for month t-1 estimated from model (1) using past 36-month rolling estimation window. Besides the sentiment beta, the independent variables include various fund characteristics (e.g., fund age, fund size, management fee, incentive fee, lockup period, and redemption notice period), and investment style dummies.

[Insert Table 6 about here.]

Table 6 reports the results of Fama-MacBeth cross-sectional regression. In both univariate (with sentiment beta as the only independent variable) and multivariate regressions, with either fund excess return or alpha as the dependent variable, the coefficient on sentiment beta is positive and significant. This corroborates the portfolio sorting results in Table 4, and reveals a robust positive relationship between the sentiment risk exposure and hedge fund performance. After controlling for various fund characteristics, an one standard-deviation increase in the sentiment beta is associated with a 0.269% (t-statistic=2.94) increase in monthly fund return and a 0.179% (t-statistic=3.48) increase in fund alpha. The coefficients of control variables are generally consistent with prior studies. For example, funds with high-watermark, older funds, funds

with higher management fee and higher minimum investment amount tend to have better performance.

Table 6 Panel B shows that the regression results are robust to controlling for default beta and inflation beta. Consistent with Bali, Brown, and Caglayan (2011), default beta is significantly and positively related to hedge fund returns. But the presence of default beta and inflation beta barely affects the coefficient estimate for sentiment beta or its statistical significance.

4.4 Can our results be explained by sentiment risk premium for stocks?

Since we focus on equity hedge funds, it is possible that the positive relation between hedge fund returns and their sentiment beta arises mechanically—it might be that funds with high sentiment beta hold stocks that are more exposed to investor sentiment risk and sentiment risk is priced in the stock market.

Table 7 examines whether sentiment beta spreads stock return and if so, whether our results for equity hedge funds is a mere reflection of such a relation for stocks. Panel A of Table 7 uses the same approach as Table 4 Panel A, but replaces hedge funds by individual stocks. We estimate sentiment beta of each stock using 36-month rolling window and then form 10 portfolios of stocks sorted by their sentiment beta. We find that over the 1994-2010 sample period, sentiment beta significantly spreads stock returns. This relation is further verified by cross-sectional regressions in Table 7 Panel B. The coefficient on sentiment beta in the stock return regressions is only about a quarter in magnitude of the same coefficient in the hedge fund return regressions. Thus, the effect of sentiment beta is stronger in hedge funds. This can be seen also by comparing

the alpha of the high minus low sentiment beta spread portfolio: 0.48% per month in the case of stock versus 0.99% for hedge funds.

Table 7 Panel C reports the results of a time-series regression where the dependent variable is the returns of the high minus low sentiment beta hedge funds, with the key regressor being the returns of the spread portfolio of stocks sorted by sentiment beta. We also control for standard risk factors for hedge funds (e.g., Fung and Hsieh factors and liquidity risk). There is a significant and positive correlation between the returns of the two spread portfolios sorted on sentiment beta (one for stocks, and the other for hedge funds). However, after we control for the top-minus-bottom spread portfolio of stocks sorted by their sentiment beta, high sentiment beta hedge funds still earn significantly higher returns. In fact, the alpha of portfolio of the high minus low sentiment beta hedge funds is barely changed (compare the intercept of Table 7 Panel C to that in Table 4 Panel A).

Thus, the positive relation between equity hedge fund returns and their sentiment beta cannot be simply explained by what looks like a similar finding in the stock market.[11] After all, hedge funds engage in active trading and their strategies are dynamic.

[Insert Table 7 about here.]

4.5 Long-horizon effect of sentiment risk

We have tested the relation between hedge fund sentiment beta estimated from historical data and fund average return over the next month. Next, we examine long-term effect of senti-

[11] In an unreported table (available upon request), we find that equity mutual funds whose sentiment betas rank in the top decile on average outperform those in the bottom decile by 0.30% next month, which is about half the magnitude as the case for hedge funds. More importantly, once controlling for returns of the high sentiment beta minus low sentiment beta portfolio of stocks, the effect of sentiment beta for mutual funds becomes insignificant, both economically and statistically. This is in sharp contrast to our results for hedge funds.

ment risk exposure. Table 8 reports the average monthly returns of portfolios of hedge funds sorted by their sentiment beta (the same portfolios constructed in Table 4 Panel A) over various holding horizon (ranging from 3 months to 12 months) after portfolio formations. In Table 4, we only study the fund return during the first month after portfolio formation.

[Insert Table 8 about here.]

We find the average monthly excess returns and alphas both decline with the length of holding period. Over the next 3 (resp. 6 and 9) months, the hedge funds belonging to the top sentiment beta decile on average outperform those from the bottom decile by 0.54% (resp. 0.43% and 0.36%) per month. At the 12-month horizon, the difference in return shrinks to 0.29%, which is no longer statistically significant.

The results in Table 8 are consistent with the time variation in hedge fund's sentiment beta, which could result from the dynamic nature of hedge fund trading strategies. In untabulated tests, we find that only about 60% (resp. 50%) of the hedge funds currently ranked in the top decile by sentiment beta still remains in the top decile after 6 months (resp. 12 months).

5. Additional findings

In this section, we investigate in greater depth the relation between sentiment beta and hedge fund returns. We take into account heterogeneity among hedge funds in terms of their styles and net fund flow. We examine for which styles of hedge funds our results are stronger, as well as whether our results are robust across funds with different level of net flow. Finally, we study whether our results are robust in periods of different levels of investor sentiment (i.e., high versus low initial level of sentiment).

5.1 Style analysis

We have controlled for fund style dummies in examining the relation between hedge fund performance and sentiment beta (see Table 6). In Table 9, we analyze the effect of sentiment beta separately for different investment styles of hedge funds. We find that exposure to sentiment risk is positively and significantly related to hedge fund returns for the directional funds (emerging market, global macro and long/short equity) and multi-strategy funds. In contrast, sentiment beta has no significant effect at all for non-directional funds (such as event driven, equity market neutral strategies) or funds of hedge funds.

[Insert Table 9 about here.]

5.2 Effect of fund flow

Here, we examine how the relation between sentiment beta and hedge fund returns may be affected by fund flow, given fund flow is likely to affect fund trading and thus both fund's exposure to sentiment risk and returns.

We measure the net fund flow for each hedge fund i as the percentage change in assets under management of the fund between the beginning and the end of month t, net of investment returns, assuming flows are invested at the end of the period:

$$\text{Flow}_{i,t} = \frac{\text{Assets}_{i,t} - \text{Assets}_{i,t-1}(1+r_{i,t})}{\text{Assets}_{i,t-1}} \quad (4)$$

where $Assets_{i,t}$ is asset under management of fund i in month t, and $r_{i,t}$ is after-fee return for fund i in month t. The top one percent of flows is winsorized to prevent outliers from affecting our analysis.

Each month, we first sort hedge funds into terciles (low, medium and high) based on their net flow. Within each group, hedge funds are then sorted into quintiles based on their sentiment beta. Table 10 reports the average returns of the portfolios over the next month after portfolio formation, separately among the high flow funds (Panel A) and among the low flow funds (Panel B). When fund flows are high, the high sentiment beta quintile funds on average outperform the low sentiment beta quintile funds by 0.39%. By comparison, the difference becomes 0.47% among the low flow funds. While the effect of sentiment risk is somewhat stronger among funds that just experienced lower inflows (or larger outflows), it is significant for the high flow funds as well.

[Insert Table 10 about here.]

Cross-sectional regressions results reported in Table 11 confirm that our results are not driven by fund flows. There, we explicitly control for fund flow as well as the interaction of fund flow and sentiment beta when we regress next month's hedge fund return on sentiment beta. We also control for fund characteristics and style dummies. There is some evidence that net flow significantly and positively predicts fund performance. However, the sentiment beta coefficient remains significant after controlling for fund flow.[12] In addition, the interaction term between fund flow and sentiment beta is insignificant. This is consistent with the finding in Table 10 that

[12] In an unreported table, we find that fund flow is positively correlated with lagged level of investor sentiment, but there is no significant relation between fund flow and sentiment beta.

the estimated effect of sentiment risk does not differ materially for high flow funds versus for low flow funds.

[Insert Table 11 about here.]

5.3 Effect of sentiment level

Finally, in Table 12, we study whether the relation between sentiment beta and hedge fund return depends on the level of investor sentiment. This test is motivated by Stambaugh, Yu, and Yuan (2012). They document that many asset pricing anomalies are profitable only when the initial level of investor sentiment is high.

We classify each month into either high-sentiment period or low-sentiment period based on whether the beginning of the month value of Baker-Wurgler sentiment index is higher or lower than its median value over the sample period Jan 1997 to Dec 2010. Each month, hedge funds are sorted into ten portfolios based on their sentiment beta. Table 12 reports the next month average return of the ten portfolios, separately for the months when the initial sentiment level is high and for the months when the initial sentiment level is low.

Our results are robust across both high and low sentiment periods. Sentiment beta is significantly and positively related to future returns of hedge funds both when the beginning of the period investor sentiment is high and when it is low. The magnitude of the sentiment-beta effect is about the same across high and low sentiment periods. The stable price of noise trader risk for hedge funds differs from the finding of Stambaugh, Yu, and Yuan (2012) that many anomalies occur mainly when the initial level of investor sentiment is high. This comparison highlights the

fact that our results manifest compensation for a risk induced by the noise traders instead of mis-pricing.

[Insert Table 12 about here.]

6. Conclusion

In this paper, we examine whether fluctuation in investor sentiment is a priced risk factor in hedge funds. Using a comprehensive sample of equity-oriented hedge funds from January 1994 to December 2010, we find a significant and positive relation between sentiment beta and future returns of hedge funds. Funds that ranked in the top decile by sentiment beta on average outperform those in the bottom decile by 0.62% over the next month. Regression results confirm this positive relation, even after controlling for financial and macroeconomic risk factors identified in previous studies on hedge fund returns, as well as for various fund characteristics. The positive relation between sentiment beta and hedge fund return cannot be explained by a similar effect of sentiment risk in the stock market, or by the effect of fund flows. It holds during both periods of high investor sentiment as well as periods of low sentiment.

Our paper contributes to a better understanding of how sentiment matters for asset pricing. We are the first to show that exposure to the fluctuations in investor sentiment is positively related to hedge fund return. Our paper also contributes to the alpha versus beta debate surrounding hedge fund performance. We find that more skilled hedge funds, such as those with high water-mark, high management fee and incentive fee, high minimum investment amount and long lock-up period for redemption, have significantly lower exposures to sentiment risk. For those funds

with high sentiment beta, what appears to be alpha with respect to the risk factors used in previous studies could be merely compensations for exposures to noise trader risk.

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Figure 1 Time series of the Baker-Wurgler sentiment factor

This figure plots monthly time series of the Baker and Wurgler sentiment-change index for the period Jan 1994 to Dec 2010. The Baker and Wurgler (2007) sentiment index derives from six proxies of investor sentiment: closed-end fund discount, the number and the first-day returns of IPO's, NYSE turnover, the equity share in total new issues, and the dividend premium. To remove the potential impacts of business cycle on these six sentiment proxies, Baker and Wurgler regress each of six proxies on a set of measures for the economics cycles and use the residuals from the regressions as the orthogonalized proxies for sentiment. Their sentiment-change index is the first principal component of changes in six orthogonalized sentiment proxies.

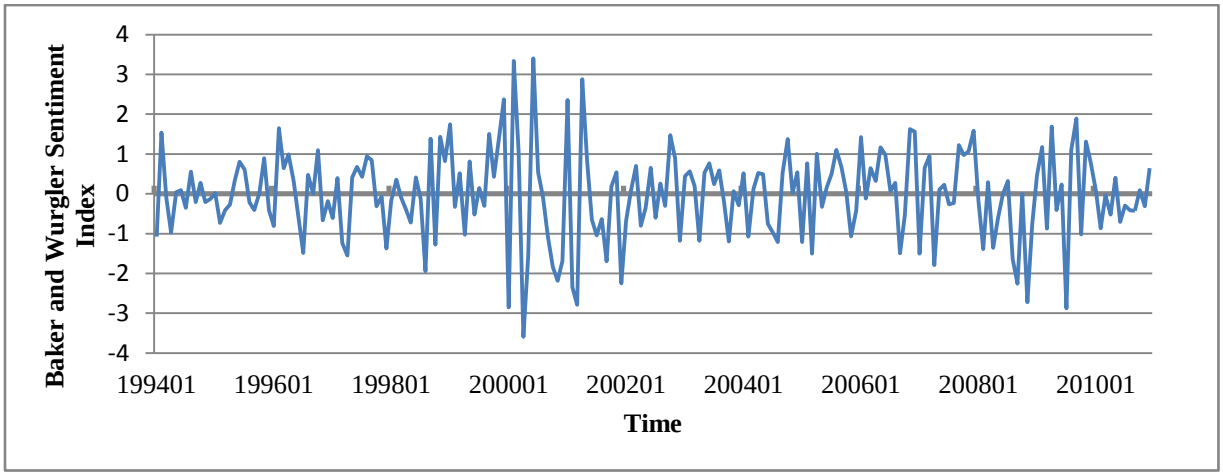
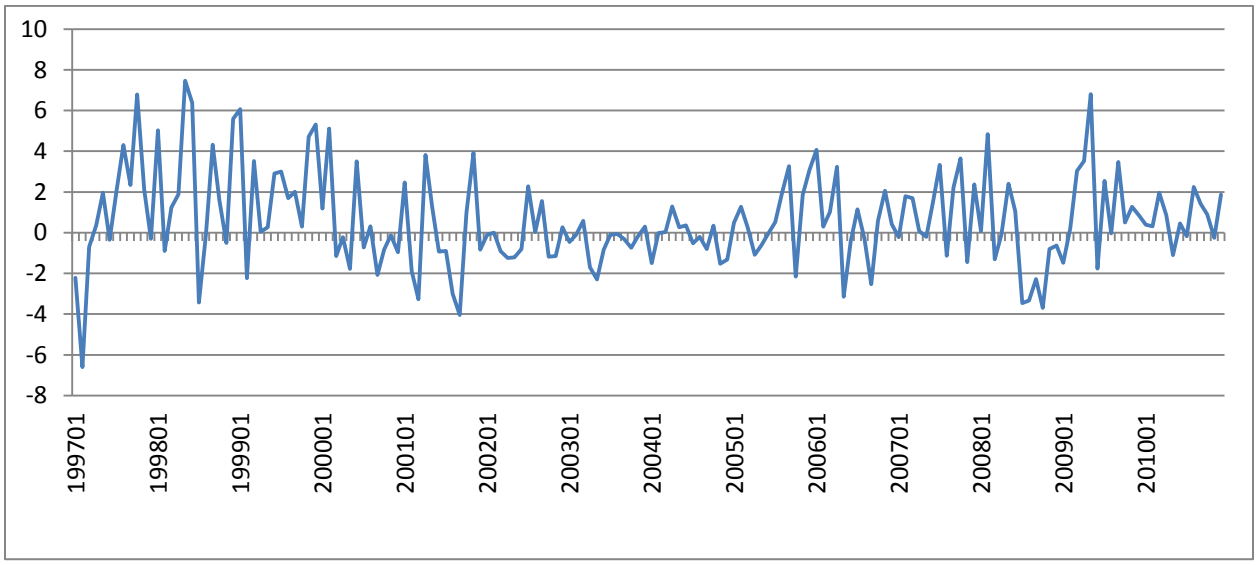


Figure 2 Time series of high-minus-low sentiment-beta portfolio of hedge funds

This figure plots the time series of returns of the high-minus-low sentiment-beta portfolio of hedge funds. In each month, hedge funds are sorted into 10 equally weighted portfolios based on their sentiment betas. The sentiment beta for each fund is estimated by regressing the fund's monthly excess returns on the sentiment factor, controlling for the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor.. We use a rolling window of 36 previous months data to estimate the sentiment beta for each hedge fund that has at least 30 non-missing return observations in the previous 36 months. The panels plot the returns to the high-minus-low portfolio for one-, three-, and six-month holding periods.

Panel A. One-month holding period



Panel B. Three-month holding period

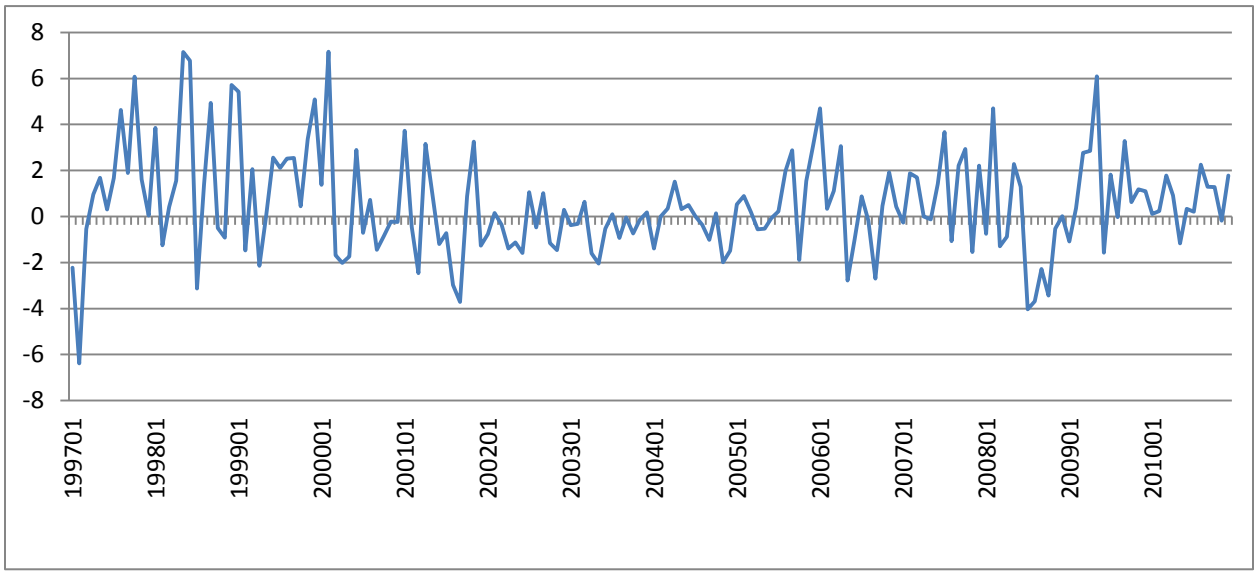


Figure 2, cont.

Panel C. Six-month holding period

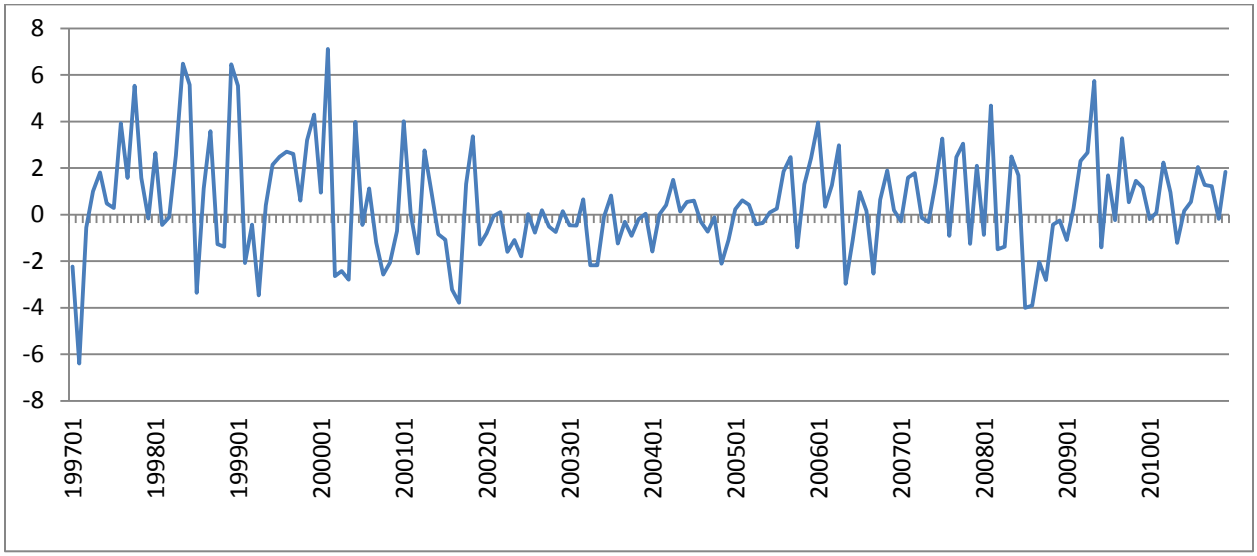


Table 1 Summary Statistics of Hedge Fund Returns

The hedge fund data are from the Lipper TASS hedge fund database. TASS provides data on both active and defunct hedge funds beginning in 1994. The first 12 months of return data for each fund are excluded to address backfilling bias. Our sample includes only equity-oriented funds that report net-of-fee returns in U.S. dollars on a monthly basis and have assets under management (AUM) of at least $5 million. The "Mean" and "Median" columns reports the average (median) monthly hedge fund net-of-fee return (in percent) in excess of the risk free rate.

	Number of funds	Mean	Median	Standard Deviation
Panel A: All Funds, per year				
1994	359	-0.40	-0.26	3.80
1995	495	0.93	0.76	3.93
1996	654	1.04	0.89	3.94
1997	804	1.08	0.82	4.50
1998	992	0.13	0.37	5.26
1999	1166	1.76	0.93	4.93
2000	1379	0.19	0.31	5.40
2001	1530	0.18	0.27	4.15
2002	1704	-0.09	0.14	3.49
2003	1974	1.32	0.85	2.89
2004	2262	0.61	0.46	2.65
2005	2465	0.50	0.47	2.81
2006	2612	0.66	0.57	2.87
2007	2808	0.58	0.53	3.22
2008	2968	-1.75	-1.06	4.73
2009	2358	1.45	0.98	3.87
2010	2079	0.67	0.57	3.42
Panel B: Full sample, by investment style				
Convertible Arbitrage	186	0.35	0.44	2.84
Event Driven	537	0.50	0.51	2.90
Emerging Market	513	0.79	0.76	5.61
Equity Market Neutral	309	0.28	0.26	2.42
Fund of Funds	1845	0.19	0.39	2.82
Global Macro	303	0.53	0.32	4.13
Long/Short Equity	1773	0.58	0.54	4.60
Multi-strategy	376	0.46	0.51	3.47
All funds	5842	0.44	0.46	3.86

Table 2 Summary Statistics of Fund Characteristics

This table reports the summary statistics for hedge fund characteristics. Management Fee is expressed as a percentage of assets under management. Incentive fee is reported in the percent of the profits. Minimum Investment is the minimum required investment in millions of dollars. Log (age) is the natural logarithm of fund age in months. Log (fund size) is the natural logarithm of hedge funds size in dollars. Lockup is the length of lock-up period in months. Notice is redemption notice period in months. High Water Mark is an indicator variable that equals one if the fund adopts a high-water mark provision and 0 otherwise.

	P1	P99	Mean	Median	STD	P25	P75
Management Fee	0.00	3.00	1.37	1.50	0.50	1.00	1.50
Incentive Fee	0.00	25.00	15.53	20.00	7.18	10.00	20.00
Minimum Investment	0.00	10.00	0.90	0.50	1.44	0.15	1.00
log(age)	3.00	5.66	4.56	4.62	0.57	4.19	5.00
log(fund size)	15.50	21.46	17.83	17.71	1.38	16.78	18.75
Lockup	0.00	25.00	3.80	0.00	6.28	0.00	12.00
Notice	0.00	3.33	1.38	1.00	0.88	1.00	2.00
High Water Mark	0.00	1.00	0.65	1.00	0.48	0.00	1.00

Table 3 Summary Statistics of Sentiment Factor and Other Factors

Panel A reports summary statistics for the Backer and Wurgler (2007) sentiment-change index (sentiment factor), the Pastor and Stambaugh (2003) liquidity factor, inflation rate (INF), default spread (DEF), as well as the Fung and Hsieh (2004) seven factors (Mktrf, SMB, Ptfsbd, Ptfsfx, Ptfscom, ΔTerm, and ΔCredit). In Fung and Hsieh (2004), ΔTerm is measured by the change in the constant maturity yield of the ten-year Treasury(YLDCHG) and ΔCredit is measured by the change in the spread between Moody's Baa yield and the ten-year Treasury(BAAMTSY). In our study, we replace YLDCHG and BAAMTSY by tradable factors. Specially, we use the spread between 10-Year Treasury Constant Maturity Rate and risk free rate to mimic the change in term spread (ΔTerm) and use the spread between Barclays Corporate Bond Baa Index and 10-Year Treasury Constant Maturity Rate to mimic the change in credit spread (ΔCredit). SMB is the Fama-French (1993) size factor. Ptfsbd is a trend-following factor on bonds. Ptfsfx is a trend-following factor on foreign exchange. Ptfscom is a trend-following factor on commodity. INF is monthly inflation rate based on US CPI. DEF is the spread between the yields on BAA-rated and AAA-rated corporate bonds. Panel B reports the correlation matrix of all these factors. The sample period is Jan 1994 to Dec 2010.

Panel A: Summary statistics

	N	P1	P25	Median	P75	P99	Mean	STD
Sentiment	204	-2.85	-0.66	0.03	0.65	2.88	-0.02	1.11
Liquidity	204	-0.09	-0.01	0.01	0.03	0.11	0.01	0.04
Mktrf	204	-10.76	-2.34	1.27	3.56	8.76	0.51	4.71
SMB	204	-6.78	-2.07	-0.06	2.40	7.66	0.24	3.67
UMD	204	-16.31	-1.30	0.71	3.06	13.20	0.48	5.65
Ptfsbd	204	-23.74	-11.50	-4.82	3.96	43.65	-1.45	14.97
Ptfsfx	204	-29.74	-13.13	-4.31	8.85	66.01	0.00	19.41
Ptfscom	204	-22.72	-9.60	-2.95	5.94	39.62	-0.38	13.77
ΔTerm	204	-0.08	0.06	0.13	0.24	0.33	0.14	0.11
ΔCredit	204	-7.75	-1.23	0.30	1.57	6.02	0.24	2.70
INF	204	-1.01	0.05	0.20	0.40	0.91	0.20	0.35
DEF	204	0.55	0.68	0.84	1.08	3.09	0.96	0.48

Table 3, cont.

Panel B: Correlation of factors

Variable	Sentiment	Liquidity	Mktrf	SMB	UMD	Ptfsbd	Ptfsfx	Ptfscom	ΔTerm	ΔCredit	INF	DEF
Sentiment	1.00											
Liquidity	0.01	1.00										
Mktrf	0.33	0.09	1.00									
SMB	0.34	0.03	0.23	1.00								
UMD	-0.03	0.03	-0.28	0.09	1.00							
Ptfsbd	-0.01	-0.01	-0.20	-0.06	-0.01	1.00						
Ptfsfx	-0.10	-0.16	-0.18	-0.01	0.12	0.23	1.00					
Ptfscom	-0.04	-0.08	-0.13	-0.03	0.21	0.18	0.38	1.00				
ΔTerm	0.00	0.01	0.04	0.16	-0.06	-0.04	-0.06	-0.05	1.00			
ΔCredit	0.00	0.07	0.35	0.06	-0.17	-0.01	-0.12	-0.08	-0.03	1.00		
INF	0.28	0.08	0.03	0.02	0.02	-0.19	-0.14	-0.08	-0.02	-0.15	1.00	
DEF	-0.07	0.00	-0.12	0.06	-0.21	0.05	0.07	-0.02	0.30	0.11	-0.25	1.00

Table 4 Sentiment Beta and Hedge Fund Returns: Portfolio Sorts

This table reports the next month average returns of ten equal-weighted portfolios of hedge funds sorted by their sentiment beta. The sentiment beta is estimated each month for each hedge fund with at least 30 returns observations over the prior 36 months, by regressing the fund's excess returns on the Baker and Wurgler sentiment-change index, controlling the Pastor and Stambaugh (2003) liquidity factor, the Carhart (1997) momentum factor and the Fung and Hsieh (2004) seven factors. In panel B, sentiment beta is estimated with two additional risk factors, default spreads and inflation rates. Excess return is the fund net-of-fee return in excess of the risk free rate. Alpha is estimated relative to the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. Both excess return and alpha are reported in percent (per month). The portfolio sorts are rebalanced monthly from Jan 1997 to Dec 2010.

Panel A

Portfolio	Excess return	t-stat	Alpha	t-stat
10(High)	0.84	3.19	0.59	2.33
9	0.57	3.22	0.25	1.60
8	0.44	2.97	0.26	1.86
7	0.38	3.01	0.24	2.09
6	0.32	2.50	0.08	0.71
5	0.38	3.14	0.17	1.42
4	0.46	3.51	0.29	2.55
3	0.49	3.23	0.21	1.55
2	0.41	2.54	0.10	0.71
1(Low)	0.22	1.06	-0.39	-1.60
Spread (10 minus 1)	0.62	3.49	0.99	3.67

Table 4, cont.

Panel B

Portfolio	Excess return	t-stat	Alpha	t-stat
10(High)	0.84	3.43	0.54	2.42
9	0.55	3.15	0.32	2.16
8	0.46	3.21	0.25	1.99
7	0.36	2.93	0.12	1.02
6	0.41	3.23	0.23	1.95
5	0.4	3.08	0.14	1.06
4	0.42	3.07	0.22	2.02
3	0.42	2.74	0.22	1.76
2	0.4	2.54	0.03	0.21
1(Low)	0.25	1.11	-0.29	-1.16
Spread (10 minus 1)	0.59	3.66	0.82	3.62

Table 5 Sentiment Beta and Fund Characteristics

This table reports the results from Fama-Macbeth regressions of sentiment beta on fund characteristics. In specification (1), the sentiment beta is estimated from regressing the fund's monthly return on the Baker-Wurgler sentiment-change index while controlling the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. In specification (2), the sentiment beta is estimated with two additional regressors, default spreads and inflation rates. The monthly cross-sectional regressions start in Jan 1997 and end in Dec 2010.

Variable	Coefficient	t-statistic	Coefficient	t-statistic
	(1)		(2)	
Intercept	-0.003	-0.052	-0.016	-0.253
High Water Mark	-0.021	-5.679	-0.029	-6.442
Incentive Fee	-0.002	-7.631	-0.003	-7.478
Management Fee	-0.019	-4.060	-0.044	-7.644
Minimum Investment	-0.008	-7.196	-0.008	-5.239
Age_{t-1}	0.003	0.527	0.000	-0.003
Excess $Return_{t-1}$	0.006	2.079	0.003	1.073
Fund $Flow_{t-1}$	0.030	0.818	-0.038	-1.083
Fund $Size_{t-1}$	0.002	0.685	0.004	1.171
Lockup	0.000	-0.673	-0.002	-2.864
Notice	0.029	6.722	0.026	6.594
Style Dummies	Yes		Yes	
Adjusted R^2	0.114		0.106	

Table 6 Sentiment Beta and Hedge Fund Returns: Cross-Sectional Regressions

This table reports results from the Fama-MacBeth (1973) regressions of next month hedge fund excess returns, as well as their alphas, on funds' sentiment beta controlling for fund characteristics and investment styles. Excess return is the fund net-of-fee return in excess of the risk free rate. In panel A, sentiment beta is estimated from regressing the fund's monthly return on the Baker-Wurgler sentiment-change index while controlling for the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. In panel B, sentiment beta is estimated with two additional risk factors, default spreads and inflation rates. The sentiment beta is estimated each month for each hedge fund with at least 30 non-missing returns observations over the prior 36-month, using the past 36-month return observations prior to portfolio formation. Alpha is estimated relative to the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. Control variables include incentive fee in percent, management fee in percent, log of fund age in months, log of hedge funds size in dollars, lock-up period in months, redemption notice period in months, high water mark dummy (1 if a high water mark provision is present and 0 otherwise) and investment style dummies. The monthly cross-sectional regressions start in Jan 1997 and end in Dec 2010.

Panel A

	Dependent Variable							
	Monthly Excess Return				Monthly Alpha			
Variable	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept	0.67	4.09	0.12	0.26	0.27	4.31	-0.54	-1.92
Sentiment Beta	0.29	2.78	0.26	2.94	0.20	3.40	0.17	3.48
High Water Mark			0.17	3.66			0.09	3.40
Incentive Fee			0.00	-0.34			0.01	3.07
Management Fee			0.10	2.11			0.13	5.04
Minimum Invest-ment			0.03	2.20			0.03	4.35
Age			0.30	5.13			0.14	3.41
Fund Size			-0.07	-2.79			-0.02	-1.68
Lockup			0.04	0.79			-0.02	-0.58
Notice			0.03	0.95			0.02	1.39
Style Dummies	No		Yes		No		Yes	
Adjusted R^2	0.02		0.11		0.02		0.08	

Table 6, cont.

Panel B

	Dependent Variable							
	Monthly Excess Return				Monthly Alpha			
Variable	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept	0.65	3.90	-0.02	-0.06	0.26	4.27	-0.65	-2.37
Sentiment Beta	0.29	3.28	0.21	2.61	0.22	4.33	0.17	3.77
DEF Beta			0.09	4.46			0.01	2.02
INF Beta			0.01	0.22			-0.01	-0.42
High Water Mark			0.15	3.41			0.08	3.20
Incentive Fee			0.00	-0.05			0.01	3.54
Management Fee			0.10	2.08			0.13	5.21
Minimum Invest-ment			0.03	1.86			0.03	4.17
Age			0.26	4.51			0.13	3.27
Fund size			-0.05	-2.13			-0.01	-1.01
Lockup			0.04	0.89			-0.02	-0.49
Notice			0.04	1.26			0.03	1.49
Style Dummies	No		Yes		No		Yes	
Adjusted R^2	0.02		0.13		0.02		0.10	

Table 7 Sentiment Beta and Stock Returns

Panel A reports the returns of ten portfolios of stocks sorted by sentiment beta over the first month after portfolio formation. Panel B of this table reports results from the Fama-MacBeth (1973) regressions of next month's stock returns on their sentiment beta controlling for liquidity beta, market beta, stock size and book-to-market ratio. Panel C reports the result of a time-series regression, with differences in returns between high and low sentiment-beta hedge funds as the dependent variable, and the returns of a spread portfolio of stocks (high sentiment beta minus low sentiment beta) and other risk factors as the independent variables. Sentiment beta of a stock is estimated from regressing the stock's monthly excess return on the Baker-Wurgler sentiment-change index while controlling for the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. The sentiment beta is estimated for each stock with at least 30 non-missing returns observations over the prior 36-month, using the past 36-month return observations prior to portfolio formation. The test period is from Jan 1997 to Dec 2010.

Panel A: Portfolio sorts of stocks

Portfolio	Excess return	t-stat	Alpha	t-stat
10(High)	1.31	1.83	0.64	2.04
9	1.20	2.12	0.55	2.92
8	1.10	2.25	0.48	3.16
7	0.91	2.09	0.30	2.49
6	0.89	2.22	0.27	2.51
5	0.82	2.03	0.22	1.95
4	0.87	2.15	0.32	2.85
3	0.71	1.64	0.09	0.72
2	0.71	1.42	0.07	0.47
1(Low)	0.77	1.14	0.15	0.59
Spread (10 minus 1)	0.55	2.87	0.48	2.49

Panel B: Cross-sectional regressions of stock returns

	Dependent Variable=Monthly Return			
Variable	Coefficient	t-stat	Coefficient	t-stat
Intercept	0.012	2.393	0.025	1.918
Sentiment Beta	0.060	3.379	0.042	2.152
Liquidity Beta			0.001	1.443
Market Beta			0.002	1.281
log(size)			0.002	1.216
log(Book-to-market)			-0.001	-1.201

Table 7, cont.

Panel C: Regressing differences in returns between high and low sentiment-beta hedge funds on the returns of a spread portfolio of stocks (high sentiment beta minus low sentiment beta) and other risk factors.

Variable	Coefficient	t-stat
Intercept	0.95	3.67
Mktrf	0.16	4.11
Liquidity	-2.54	-0.64
SMB	0.04	0.98
UMD	0.03	1.10
PTFSBD	0.03	2.33
PTFSFX	-0.01	-1.18
PTFSCOM	0.00	0.10
ΔCredit	-3.26	-2.22
ΔTerm	0.00	-0.06
Stock Sentiment-beta spread portfolio	0.22	3.24

Table 8 Long-Horizon Returns to Portfolios of Hedge Funds Sorted by Sentiment Beta

In each month, hedge funds are sorted into ten equally weighted portfolios based on their sentiment beta. Portfolios are then held for different holding periods, i.e. 3-, 6-, 9- and 12-month. This table also reports the excess return and alpha of the high-minus-low spread portfolio for different holding periods. Excess return is the fund net-of-fee return in excess of the risk free rate. Alpha is estimated relative to the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. Both excess return and alpha are expressed in percent per month, We report Newey-West (1987) t-statistics in the parentheses. The portfolio sorts start in Jan 1997 and end in Dec 2010.

Panel A: Holding period=3 months

	Sentiment Beta Deciles										
Portfolio	10(High)	9	8	7	6	5	4	3	2	1(Low)	Spread (10 minus 1)
Excess return (percent/month)	0.80	0.62	0.42	0.38	0.33	0.40	0.43	0.49	0.38	0.26	0.54
	(3.07)	(3.43)	(2.91)	(3.05)	(2.63)	(3.26)	(3.34)	(3.25)	(2.28)	(1.22)	(3.14)
Alpha (percent/month)	0.54	0.37	0.25	0.18	0.12	0.18	0.24	0.25	0.03	-0.42	0.96
	(2.12)	(2.20)	(1.75)	(1.41)	(0.91)	(1.33)	(1.99)	(1.55)	(0.16)	(-1.68)	(3.74)

Panel B: Holding period=6 months

	Sentiment Beta Deciles										
Portfolio	10(High)	9	8	7	6	5	4	3	2	1(Low)	Spread (10 minus 1)
Excess return (percent/month)	0.78	0.57	0.43	0.39	0.37	0.42	0.41	0.48	0.33	0.35	0.43
	(3.01)	(3.21)	(2.95)	(3.13)	(2.99)	(3.52)	(3.11)	(3.24)	(1.97)	(1.65)	(2.54)
Alpha (percent/month)	0.48	0.35	0.28	0.17	0.15	0.22	0.20	0.25	-0.08	-0.24	0.73
	(1.91)	(2.11)	(1.89)	(1.26)	(1.10)	(1.52)	(1.34)	(1.59)	(-0.40)	(-0.90)	(2.79)

Panel C: Holding period=9 months

	Sentiment Beta Deciles										
Portfolio	10(High)	9	8	7	6	5	4	3	2	1(Low)	Spread (10 minus 1)
Excess return (percent/month)	0.75	0.56	0.44	0.39	0.37	0.41	0.41	0.47	0.33	0.39	0.36
	(2.92)	(3.11)	(3.00)	(3.09)	(3.04)	(3.41)	(3.18)	(3.18)	(1.97)	(1.88)	(2.14)
Alpha (percent/month)	0.43	0.33	0.27	0.17	0.17	0.19	0.22	0.23	-0.07	-0.17	0.61
	(1.85)	(2.10)	(1.76)	(1.18)	(1.23)	(1.30)	(1.67)	(1.59)	(-0.33)	(-0.64)	(2.38)

Table 8, cont.

Panel D: Holding period=12 months

	Sentiment Beta Deciles										
Portfolio	10(High)	9	8	7	6	5	4	3	2	1(Low)	Spread (10 minus 1)
Excess return (percent/month)	0.73	0.55	0.45	0.38	0.37	0.4	0.4	0.47	0.36	0.43	0.29
	(2.82)	(3.06)	(3.06)	(3.01)	(3.00)	(3.34)	(3.12)	(3.24)	(2.08)	(2.06)	(1.79)
Alpha (percent/month)	0.36	0.29	0.27	0.16	0.16	0.19	0.21	0.24	-0.02	-0.10	0.46
	(1.66)	(1.91)	(1.72)	(1.04)	(1.19)	(1.24)	(1.65)	(1.81)	(-0.09)	(-0.37)	(1.75)

Table 9 Portfolio Sorts on Sentiment Beta for Hedge Funds within Different Investment Styles

For hedge funds in each investment style, we sort hedge funds into quintiles based on their sentiment risk exposure. The directional hedge funds include the funds with the investment style of emerging market, global macro, and long/short equity. The non-directional hedge funds include the funds with the investment style of convertible arbitrage, event driven, and equity market neutral. In panel A, the sentiment beta of each fund is estimated using a regression of the fund's monthly excess return on Baker-Wurgler sentiment-change index, controlling for the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. In panel B, sentiment beta is estimated with two additional factors, default spreads and inflation rates. The sentiment beta is estimated for each hedge fund with at least 30 returns observations over the prior 36 months. Alpha is estimated relative to the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. The portfolio sorts start in Jan 1997 and end in Dec 2010.

Panel A

	Portfolio	Excess return	t-stat	Alpha	t-stat
Directional Hedge Funds	5(High)	0.91	3.37	0.69	2.86
	4	0.61	2.95	0.39	2.52
	3	0.54	2.96	0.33	2.58
	2	0.56	3.09	0.32	2.27
	1(Low)	0.27	1.26	-0.30	-1.30
	Spread (5 minus 1)	0.64	3.74	0.99	3.92
Non-directional Hedge Funds	5(High)	0.47	2.95	0.00	0.01
	4	0.35	3.36	0.15	1.29
	3	0.32	3.51	0.10	0.88
	2	0.42	4.44	0.21	2.10
	1(Low)	0.4	3.07	0.08	0.56
	Spread (5 minus 1)	0.07	0.68	-0.08	-0.55
Fund of Funds	5(High)	0.29	1.79	-0.11	-0.54
	4	0.27	2.16	0.08	0.57
	3	0.28	2.28	0.08	0.69
	2	0.32	2.54	0.14	1.07
	1(Low)	0.15	0.89	-0.17	-0.72
	Spread (5 minus 1)	0.14	1.06	0.06	0.27
Multi-strategy Funds	5(High)	1.08	5.33	1.38	4.37
	4	0.5	2.96	0.27	1.40
	3	0.41	2.95	0.03	0.13
	2	0.47	4.3	0.30	1.92
	1(Low)	0.53	2.84	0.63	2.99
	Spread (5 minus 1)	0.55	2.4	0.75	1.91

Table 9, cont.

Panel B

	Portfolio	Excess return	t-stat	Alpha	t-stat
Directional Hedge Funds	5(High)	0.88	3.43	0.62	2.76
	4	0.61	3.02	0.37	2.63
	3	0.51	2.73	0.32	2.39
	2	0.53	2.87	0.28	2.11
	1(Low)	0.35	1.63	-0.15	-0.64
	Spread (5 minus 1)	0.53	3.38	0.78	3.43
Non-directional Hedge Funds	5(High)	0.45	3.21	0.00	-0.03
	4	0.41	3.99	0.22	1.74
	3	0.32	3.47	0.08	0.74
	2	0.37	3.58	0.16	1.48
	1(Low)	0.41	2.98	0.08	0.60
	Spread (5 minus 1)	0.04	0.43	-0.09	-0.71
Fund of Funds	5(High)	0.37	2.48	0.09	0.45
	4	0.24	1.87	-0.01	-0.07
	3	0.21	1.69	-0.02	-0.13
	2	0.35	2.83	0.21	1.54
	1(Low)	0.14	0.78	-0.23	-0.99
	Spread (5 minus 1)	0.23	1.72	0.32	1.29
Multi-strategy Funds	5(High)	0.82	4.04	0.61	1.98
	4	0.59	4.37	0.44	2.95
	3	0.49	4.02	0.40	2.50
	2	0.41	3.12	0.24	1.25
	1(Low)	0.59	2.95	0.65	2.86
	Spread (5 minus 1)	0.23	0.97	-0.04	-0.10

Table 10 Double Sorts on Fund Flow and Sentiment Beta

Every month, we sort hedge funds into terciles (low, medium and high) based on their net flow. Within each group, hedge funds are then sorted into quintiles based on their sentiment beta. Each month, for each hedge fund with at least 30 returns observations over the prior 36 months, sentiment beta is estimated by regressing the fund's monthly excess return on Baker-Wurgler sentiment-change index while controlling for the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. In Panel A, we report the average excess return and alpha (in percent) for the five sentiment-beta sorted portfolios of high-flow hedge funds, as well as the excess return and alpha of high-minus-low spread portfolio of high-flow hedge funds sorted by sentiment beta. Panel B is for the low-flow hedged funds. Alpha is estimated relative to the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. The t-statistics are derived from White (1980) standard errors. The evaluation period is from Jan 1997 to Dec 2010.

Panel A: High flow funds

	Sentiment Beta Quintile					
Portfolio	5(High)	4	3	2	1(Low)	Spread (5 minus 1)
Excess return (percent/month)	0.93	0.49	0.43	0.55	0.54	0.39
	(4.20)	(3.44)	(3.59)	(3.96)	(2.87)	(2.67)
Alpha (percent/month)	0.71	0.42	0.30	0.36	0.22	0.49
	(3.24)	(2.51)	(2.28)	(2.29)	(1.06)	(2.13)

Panel B: Low flow funds

	Sentiment Beta Quintile					
Portfolio	5(High)	4	3	2	1(Low)	Spread (5 minus 1)
Excess return (percent/month)	0.57	0.32	0.34	0.46	0.11	0.47
	(2.56)	(2.22)	(2.61)	(3.14)	(0.57)	(3.14)
Alpha (percent/month)	0.35	0.05	0.06	0.33	-0.40	0.75
	(1.82)	(0.36)	(0.54)	(2.56)	(-1.83)	(3.28)

Table 11 Cross-Sectional Regressions of Hedge Fund Performance Controlling for Fund Flow

This table reports the Fama-MacBeth (1973) regressions of monthly hedge fund returns or alphas on fund's sentiment beta, controlling for fund flow and its interaction with sentiment beta, as well as fund characteristics and investment styles. Flows into each fund are defined as the percent change of net assets of the fund between the beginning of a year and the end of a year net of yearly returns. The fund characteristics controls include incentive fee in percent, management fee in percent, log of fund age in months, log of hedge funds size in dollars, lock-up period in months, redemption notice period in months, high water mark dummy (1 if a high water mark provision is present and 0 otherwise) and investment style dummies. The test sample is from Jan 1994 to Dec 2010.

	Dependent Variable							
	Monthly Excess Return				Monthly Alpha			
Variable	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept	0.66	4.04	0.05	0.09	0.25	3.92	-0.51	-1.72
Sentiment Beta	0.29	2.84	0.26	2.98	0.22	3.45	0.19	3.54
$Flow_{t-1}$	0.95	3.13	0.53	1.93	0.57	2.86	0.32	1.60
Sentiment Beta*$Flow_{t-1}$	0.69	0.96	0.60	0.86	0.66	1.32	0.64	1.27
High Water Mark			0.17	3.71			0.10	3.31
Incentive Fee			0.00	-0.45			0.00	2.55
Management Fee			0.09	2.02			0.14	4.95
Minimum Investment			0.03	2.03			0.04	4.73
Log(age)			0.30	5.14			0.15	3.35
Log(fund size)			-0.07	-2.63			-0.02	-1.87
Lockup			0.04	0.87			-0.02	-0.53
Notice			0.03	0.84			0.02	0.98
Style Dummies	No		Yes		No		Yes	
Adjusted R^2	0.03		0.11		0.03		0.09	

Table 12 Sentiment Beta and Hedge Fund Returns: Periods of High vs. Low Initial Sentiment

We classify each month into either high-sentiment period or low-sentiment period based on whether the Baker-Wurgler sentiment index is higher or lower than the median value over the sample period Jan 1997 to Dec 2010. Separately for each of the two periods, hedge funds are sorted into ten portfolios based on their sentiment beta. In panel A, the sentiment beta of each fund is estimated using a regression of the fund's monthly excess return on Baker-Wurgler sentiment-change index while controlling for the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. In panel B, sentiment beta is estimated with two additional factors, default spreads and inflation rates. The sentiment beta is estimated for each hedge fund with at least 30 returns observations over the prior 36 months. The portfolio sorts are rebalanced every month. Excess return is the fund net-of-fee return in excess of the risk free rate. Alpha is estimated relative to the Fung and Hsieh (2004) seven factors, the Carhart (1997) momentum factor, and the Pastor and Stambaugh (2003) liquidity factor. Both excess return and alpha are expressed in percent per month.

Panel A

	Portfolio	Excess return	t-stat	Alpha	t-stat
High Sentiment Period	10(High)	1.36	4.63	0.53	1.12
	9	0.86	4.43	-0.04	-0.16
	8	0.66	4.09	-0.08	-0.34
	7	0.63	4.67	0.07	0.36
	6	0.61	4.33	-0.04	-0.22
	5	0.66	5.11	0.04	0.24
	4	0.73	5.03	0.14	0.84
	3	0.80	4.99	0.12	0.75
	2	0.77	4.36	0.08	0.43
	1(Low)	0.76	3.03	-0.35	-0.98
	Spread (10 minus 1)	0.60	2.89	0.88	2.09
Low Sentiment Period	10(High)	0.32	0.74	0.83	2.73
	9	0.28	0.96	0.51	2.96
	8	0.21	0.86	0.54	3.63
	7	0.13	0.63	0.42	3.35
	6	0.02	0.12	0.21	1.51
	5	0.11	0.52	0.33	2.56
	4	0.18	0.86	0.43	3.18
	3	0.19	0.74	0.33	1.82
	2	0.05	0.20	0.20	1.02
	1(Low)	-0.32	-0.98	-0.35	-1.14
	Spread (10 minus 1)	0.63	2.20	1.18	3.17

Table 12, cont.

Panel B

	Portfolio	Excess return	t-stat	Alpha	t-stat
High Sentiment Period	10(High)	1.32	4.39	0.37	0.85
	9	0.94	4.77	0.10	0.44
	8	0.72	4.45	0.03	0.13
	7	0.60	4.36	-0.01	-0.05
	6	0.61	4.57	-0.01	-0.06
	5	0.64	4.65	-0.03	-0.18
	4	0.65	4.44	-0.02	-0.08
	3	0.80	5.19	0.15	0.81
	2	0.76	4.46	0.10	0.50
	1(Low)	0.80	3.26	-0.20	-0.60
	Spread (10 minus 1)	0.52	2.62	0.57	1.46
Low Sentiment Period	10(High)	0.35	0.90	0.77	2.98
	9	0.23	0.82	0.53	2.86
	8	0.20	0.83	0.48	3.44
	7	0.10	0.47	0.25	1.76
	6	0.14	0.66	0.45	3.09
	5	0.09	0.41	0.33	2.16
	4	0.22	0.98	0.40	3.23
	3	0.12	0.47	0.37	2.40
	2	-0.03	-0.09	0.10	0.47
	1(Low)	-0.23	-0.67	-0.25	-0.75
	Spread (10 minus 1)	0.58	2.35	1.02	3.59

Appendix: Definition of investment styles in TASS

Hedge funds in the TASS database are divided into 11 categories designed to reflect their investment styles. Below are the definitions of the different styles.

Convertible arbitrage: This strategy is identified by hedge investing in the convertible securities of a company.

Dedicated short bias: This strategy is to maintain net short as opposed to pure short exposure. Short bias managers take short position in mostly equities and derivatives.

Event driven: This strategy is defined as equity-oriented investing designed to capture price movement generated by an anticipated corporate event.

Emerging markets: This strategy involves equity or fixed income investing in emerging markets around the world.

Equity market neutral: This investment strategy is designed to exploit equity market inefficiencies and usually involves being simultaneously long and short matched equity portfolios of the same size within a county.

Fixed income arbitrage: The fixed income arbitrage aims to profit from price anomalies between related interest rate securities.

Global macro: Global macro managers carry long and short positions in any of the world's major capital or derivative markets. These positions reflect their views on overall market direction as influence by major economic trends and/or events.

Long-short equity: This directional strategy involves equity-oriented investing on both the long and short sides of the market. Managers have the ability to shift from value to growth, from small to median to large capitalization stocks, and from net long position to a net short position.

Managed futures: This strategy invests in listed financial and commodity futures markets and currency markets around the world.

Multi-strategy: This strategy invests in a combination of different strategies to reduce market risk.

Funds of funds: This strategy invests in a diversified portfolio of numerous underlying single-manager hedge funds.