Investor sentiment and mutual fund stock picking

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This version: June 30, 2021

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We thank Allaudeen Hameed, Chuan Yang Hwang, Marcin Kacperczyk, and Kalok Chan for helpful comments, Manhong Chan for able research assistance, and the General Research Fund of the Research Grants Council of the Hong Kong Special Administrative Region, China (Project No. 15501017) for research support.

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Abstract

The active share of mutual funds drops significantly when investor sentiment is high, indicating that fund managers reduce their active stock selection and stay closer to their benchmarks during such periods. Our evidence is consistent with fund managers being sentiment-prone—challenging the conventional view that it is only the preponderance of retail investors during high sentiment periods that allows sentiment to influence asset prices.

JEL Classifications: G23, G41.

Keywords: Mutual fund stock picking, Active share, Investor sentiment.

1. Introduction

Since the influential work of Baker and Wurgler (2006, 2007), there has been renewed interest among researchers in documenting the effects of investor sentiment on asset prices. Baker and Wurgler (2006, 2007) construct a novel measure of investor sentiment and show that periods of high (low) sentiment are associated with overvaluation (undervaluation) of more speculative stocks. Subsequent studies by Stambaugh, Yu, and Yuan (2012, 2014), Antoniou, Doukas, and Subrahmanyam (2013, 2016) focus on the effect of sentiment on the profitability of cross-sectional anomalies. Trading strategies based on these anomalies are found to be profitable primarily during high sentiment periods, indicating that sentiment increases the relative mispricing among stocks.

While we now have a large number of studies establishing an empirical link between investor sentiment and patterns of asset prices, there is not much direct evidence on the investor behavior that underpins this relationship. We attempt to fill this void by examining the portfolio holdings of mutual fund managers across different sentiment periods. Specifically, we examine whether mutual fund managers' stock picking becomes less active (i.e. deviate less from their benchmark) when investor sentiment is high. Such behavior, if found, suggests that fund managers become less discriminant between stocks in their information collection and trading, and can contribute to the prevalence of *relative* mispricing when sentiment is high.

We follow Cremers and Petajisto (2009) and Petajisto (2013) and use a fund's "active share" as a proxy for the activeness of its manager's stock selection, where active share is the percentage of a fund's portfolio that differs from the fund's benchmark index. We find that the average active share of mutual funds declines by 2-3% at times when there is a one-standard-deviation increase in investor sentiment. This decline is economically significant, as it is comparable in magnitude with the time-series standard deviation of average active share.

This negative relationship between investor sentiment and active share is robust to controlling for stock return comovement. This control is important—as Chue, Gul, and Mian (2019) show that stock return comovement tends to rise during periods of high investor sentiment. Since the benefit of stock picking varies inversely with the degree of return comovement, even rational managers who are not prone to investor sentiment should still react to increases in stock return comovement and become less active during these periods. To disentangle the confounding effects

of these two factors, we control for stock return comovement when estimating the explanatory power of investor sentiment for active share.

Our work builds on a number of previous studies. Cremers and Petajisto (2009) and Petajisto (2013) document that mutual fund active share has been declining over time. We show that there are cyclical variations in active share (which vary inversely with investor sentiment) around the declining trend.

Our findings are consistent with those of DeVault, Sias, and Starks (2019), who show that institutional investors are affected by investor sentiment. While these authors find that institutional investors are net buyers (sellers) of volatile stocks from individual investors during high (low) sentiment periods, we uncover another dimension of susceptibility of institutional investors to sentiment—they become less active in their overall stock selection during these periods.

Finally, Massa and Yadav (2015) examine *cross-sectional* variations in the exposure of mutual fund holdings to investor sentiment and find that funds holding stocks with lower sentiment exposure tend to be more active (as measured by a lower R-squared) and enjoy higher future returns. We examine how variations in investor sentiment in the *time series* affect the active share of mutual fund portfolios on average.

The remainder of the paper is organized as follows. Section 2 discusses our data and variables, Section 3 reports results of our analysis, and Section 4 concludes.

2. Data Description and Variable Construction

2.1. Active share

Active share is the percentage of a fund's portfolio that differs from the fund's benchmark index, defined as

$$Active\ Share_{fund} = \frac{1}{2}\sum_{i=1}^{N}\left|w_{fund,i} - w_{index,i}\right|, \quad (1)$$

where $w_{fund,i}$ and $w_{index,i}$ are stock *i*'s weights in the fund and its benchmark index, respectively, and is available at a quarterly frequency. We thank Antti Petajisto for making the tracking error and active share variables available on his web site.[1] The variables are constructed based on a matched sample of mutual funds that have returns data from the Center for Research in Stock Prices (CRSP) Mutual Fund Database and holdings data from the Thomson-Reuters Mutual Fund Ownership Database. Cremers and Petajisto (2009) and Petajisto (2013) discuss the construction of these variables in detail. Our analysis also requires data on funds' total net assets (*TNA*) under management, which we obtain from the CRSP Mutual Fund Database.

We eliminate all index funds, sector funds, and funds with *TNA* below $10 million from our sample. Our final sample contains 2,245 U.S. domestic, active (non-index) equity mutual funds, from 1985Q1 to 2009Q3.

2.2 Investor Sentiment

We employ two alternative measures of investor sentiment in our analysis. Our primary measure, labelled *Sent*, is proposed by Baker and Wurgler (2006, 2007) and downloaded from Jeffrey Wurgler's website.[2] It is constructed as the first principal component of six variables: NYSE share turnover, number of IPOs, first day returns on IPOs, share of equity issues in total debt and equity issues, closed-end fund discount, and the dividend premium. Each of these variables is orthogonalized with respect to a number of macroeconomic variables.

[1] https://www.petajisto.net/
[2] http://pages.stern.nyu.edu/~jwurgler/

This orthogonalization procedure notwithstanding, Sibley, Wang, Xing, and Zhang (2016) argue that this sentiment index is still contaminated by economic fundamentals, and suggest further orthogonalizing the index with respect to Lee's (2011) liquidity factor and the T-bill rate. We obtain the orthogonalized component, labelled *SentRes*, by regressing *Sent* on these two variables, and adopt it as an alternate measure of sentiment.

We also control for two measures of market turmoil: *VIX* (the implied volatility of S&P 500 index options, obtained from the CBOE) and the *FEARS* index (constructed by Da, Engelberg, and Gao (2015), downloaded from Zhi Da's website).[3] Daily values of both indexes are converted into quarterly series by taking simple averages within each quarter.

2.3 Stock Return Comovement

We control for stock return comovement in our multivariate regressions. Building on Morck, Yeung, and Yu (2000, MYY henceforth) and Ang, Hodrick, Xing, and Zhang (2006), we measure return comovement using the *R*-squared from the four-factor model of Carhart (1997). In each quarter and for every stock, daily stock returns are regressed on four factors:

$$r_{j,d} = \beta_0 + \beta_{mkt}\, MKT_d + \beta_{HML}\, HML_d + \beta_{SMB}\, SMB_d + \beta_{UMD}\, UMD_d + \varepsilon_{j,d} \qquad (2)$$

where $r_{j,d}$ is stock j's return on day d. *MKT*, *HML*, *SMB*, and *UMD* denote the market, value, size, and momentum factors, respectively. Our sample covers common stocks (share codes 10 and 11) traded on the NYSE, AMEX, and NASDAQ, all obtained from the CRSP database.

Next, we construct an aggregate measure of R^2, for quarter t:

$$R_t^2 = \frac{\sum_j R_{j,t}^2 \times SST_{j,t}}{\sum_j SST_{j,t}} \qquad (3)$$

where $R_{j,t}^2$ is the R^2 of Equation (1) for stock j in quarter t, and $SST_{j,t}$ represents the total sum of squared variations. Before they are used in the aggregation, the stock-quarter observations are

[3] https://www3.nd.edu/~zda/fears_post_20140512.csv

winsorized at the 1st and 99th percentiles. Finally, we apply the logistic transformation to R_t^2 to obtain an aggregate measure of stock return comovement, *Comove*$_t$, for quarter *t*:

$$Comove_t = ln\left(\frac{R_t^2}{1 - R_t^2}\right) \tag{4}$$

3. Results

The summary statistics of all the key variables are reported in Table 1. Fund statistics (active share, tracking error, and *TNA*) are close to those reported by Petajisto (2013). Average Active Share (*AAS*) is the equal-weighted, cross-sectional average of fund-level active share. *Detrended AAS* is then obtained by detrending *AAS* around a linear time trend. Although both *Sent* and *SentRes* have mean zero by construction (for a sample period that commences from 1965), the non-zero means we report here reflect the fact that our sample period starts in 1985 and thus covers only a fraction of the full series.

We regress active share in quarter *t* on contemporaneous *Sent* or *SentRes*. Following Cremers and Petajisto (2009), we control for a fund's *TNA* under management and its tracking error. We also include a time trend to capture the secular decline in active share, as documented by Cremers and Petajisto (2009) and Petajisto (2013). Our inferences are based on Thompson's (2011) standard errors, which allow for both correlations over time and across funds.

Table 2 reports results from this analysis, using *Sent* as the investor sentiment measure. First, we find that active share tends to decline over time—the linear time trend enters with a negative and significant coefficient. Specific to our question, we find that the coefficients on *Sent* are negative and significant—indicating that mutual funds engage in less stock picking during periods of high investor sentiment. The estimated coefficients imply that a one-standard-deviation increase in investor sentiment leads active share to decline by about 2-3%, which is comparable in magnitude to the time-series standard deviation of detrended average active share, *Detrended AAS* (see Table 1 for the standard deviation estimates).

In Table 3, we replace *Sent* with *SentRes* as the measure of investor sentiment. The magnitudes and statistical significance of the results are somewhat stronger than those for *Sent* reported on Table 2. Since *SentRes* has been orthogonalized with respect to liquidity and the short rate, these results suggest that our findings are indeed driven by sentiment, rather than confounding macroeconomic conditions.

We next investigate whether the negative effect of sentiment on active share is symmetric across both positive and negative sentiment periods. Yu and Yuan (2011), Stambaugh et al. (2012) and Antoniou et al. (2013, 2015) present evidence of an asymmetric effect of sentiment—stocks become mispriced primarily during periods of high (but not low) sentiment. To investigate such asymmetry, we replace *SentRes* with two variables—*SentResPos* and *AbsSentResNeg*—in Column (3) of Table 3. *SentResPos* takes the value of *SentRes* when it is positive and zero otherwise; *AbsSentResNeg* takes the *absolute* value of *SentRes* when it is negative and zero otherwise. The negative coefficient on *SentResPos* indicates that a more positive sentiment is associated with a lower active share whereas the positive coefficient on *AbsSentResNeg* indicates that a more negative sentiment is associated with a *higher* active share. This result is consistent with the findings of the aforementioned studies—that the impact of sentiment on mispricing is concentrated in periods of positive sentiment.

Finally, we examine whether market turmoil or fear plays any role in the relationship between sentiment and active share. Table 3, Column (4) shows that *VIX* enters as negative and statistically significant, suggesting that during periods of heightened market volatility, mutual funds become less discriminating across individual stocks. The *FEARS* index of Da et al. (2015), however, shows up as statistically insignificant in Column (5). In both cases, the coefficients on *SentRes* remains negative and significant, suggesting that sentiment's explanatory power for active share does not simply stem from its relationship with *VIX* or *FEARS*.

4. Conclusion

Many previous studies have suggested that cross-sectional mispricing is more prevalent when investor sentiment is high. While narratives abound in linking investor sentiment with

mispricing, we provide empirical evidence for a specific and novel channel through which such mispricing can arise. As mutual funds focus less on the differences between individual companies and become less active in their stock selection, relative mispricing increases and the returns on cross-sectional anomalies become more pronounced. Our results call into question the conventional view that it is only the preponderance of retail investors during high sentiment periods that allows sentiment to exert greater influence on prices.

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Table 1
Descriptive statistics

This table reports descriptive statistics of our key variables. *Active Share* is the percentage of a fund's portfolio that differs from the fund's benchmark index. *Tracking Error* is the standard deviation of the difference between the returns on a fund and the fund's benchmark index. *TNA* is total net assets of the fund, measured in millions US dollars. *AAS* is the equal-weighted, cross-sectional average of fund-level active share. *Detrended AAS* is obtained by detrending *AAS* using a linear time trend. *Sent* is the Baker-Wurgler (2006) index of investor sentiment. *SentRes* is the residual version of *Sent*, computed by orthogonalizing *Sent* with respect to changes in the risk-free rate and stock market liquidity. *Comove* is a measure of stock return comovement constructed from Carhart's (1997) four-factor model. *VIX* is the implied volatility of S&P 500 index options. *FEARS* is the Financial and Economic Attitudes Revealed by Search index of Da, Engelberg, and Gao (2015). We average daily values of *VIX* and *FEARS* to obtain the respective quarterly time series. The sample period is from 1985Q1 to 2009Q3, except for *VIX* (1990Q1–2009Q3) and *FEARS* (2004Q3-2009Q3), which are available for shorter periods.

Variable	Unit	No. of Obs.	Mean	Std. Dev.	Min.	P25	Median	P75	Max.
Active Share	Fund-quarter obs.	51,312	0.810	0.151	0.001	0.715	0.844	0.935	1.000
Tracking Error	Fund-quarter obs.	51,312	0.072	0.047	0.002	0.042	0.060	0.087	0.687
Total Net Assets (*TNA*, US$ Millions)	Fund-quarter obs.	51,312	1,077	4,604	10	69	213	697	195,807
Average Active Share (*AAS*)	Quarterly obs.	99	0.830	0.038	0.764	0.796	0.837	0.857	0.895
Detrended AAS	Quarterly obs.	99	0.000	0.023	-0.048	-0.016	0.008	0.016	0.037
Sent	Quarterly obs.	99	0.120	0.538	-0.757	-0.222	0.034	0.349	2.229
SentRes	Quarterly obs.	99	0.175	0.577	-1.096	-0.209	0.159	0.529	1.837
Comove	Quarterly obs.	99	-1.736	0.299	-2.080	-1.964	-1.840	-1.600	-0.788
VIX	Quarterly obs.	79	20.258	7.868	11.035	13.732	19.169	24.924	58.588
FEARS	Quarterly obs.	21	0.002	0.012	-0.028	-0.003	0.001	0.013	0.020

Table 2
Investor Sentiment and Mutual Fund Active Share

This table reports panel regressions of *Active Share* on *Sent* and control variables. *Active Share* is the percentage of a fund's portfolio that differs from the fund's benchmark index. *Sent* is the Baker-Wurgler (2006) index of investor sentiment. *TNA* is total net assets of the fund. *Tracking Error* is the standard deviation of the difference between the returns on a fund and the fund's benchmark index. *Comove* is a measure of stock return comovement constructed from Carhart's (1997) four-factor model. *Time Trend* is a linear time trend. The sample period is from 1985Q1 to 2009Q3. *t*-statistics based on Thompson's (2011) standard errors are reported in parentheses.

	Dependent Variable = *Active Share*						
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	0.871	0.888	0.897	0.761	0.627	0.752	0.617
	(105.85)	(29.29)	(35.85)	(48.29)	(9.42)	(28.41)	(8.77)
Sent	-0.014	-0.014	-0.012	-0.043	-0.038	-0.041	-0.036
	(-2.66)	(-2.74)	(-2.19)	(-5.01)	(-4.25)	(-4.79)	(-4.04)
Log(TNA)			0.004			0.015	0.015
			(0.42)			(1.92)	(1.95)
$[Log(TNA)]^2$			-0.002			-0.002	-0.002
			(-2.17)			(-3.35)	(-3.39)
Tracking Error				1.364	1.428	1.319	1.384
				(10.71)	(12.65)	(10.48)	(12.33)
Comove		0.008			-0.058		-0.058
		(0.58)			(-1.94)		(-1.98)
Time Trend	-0.001	-0.001	-0.001	-0.001	-0.0001	-0.001	-0.00005
	(-7.22)	(-5.79)	(-6.23)	(-3.06)	(-0.43)	(-2.69)	(-0.15)
Adj R^2	0.021	0.021	0.051	0.184	0.190	0.201	0.207
No. of fund-quarter observations	51,312	51,312	51,312	51,312	51,312	51,312	51,312

Table 3
Residual Investor Sentiment and Mutual Fund Active Share

This table reports panel regressions of *Active Share* on *SentRes* and control variables. *Active Share* is the percentage of a fund's portfolio that differs from the fund's benchmark index. *Sent* is the Baker-Wurgler (2006) index of investor sentiment. *SentRes* is the residual version of *Sent*, computed by orthogonalizing *Sent* with respect to changes in the risk-free rate and stock market liquidity. *SentResPos* takes the value of *SentRes* when it is positive and zero otherwise; *AbsSentResNeg* takes the absolute value of *SentRes* when it is negative and zero otherwise. *VIX* is the implied volatility of the S&P 500 index options. *FEARS* is the "Financial and Economic Attitudes Revealed by Search" index of Da, Engelberg, and Gao (2015). *TNA* is total net assets of the fund. *Tracking Error* is the standard deviation of the difference between the returns on a fund and the fund's benchmark index. *Comove* is a measure of stock return comovement constructed from Carhart's (1997) four-factor model. *Time Trend* is a linear time trend. *t*-statistics based on Thompson's (2011) standard errors are reported in parentheses.

	Dependent Variable = *Active Share*				
Independent Variables	(1)	(2)	(3)	(4)	(5)
Intercept	0.880	0.669	0.657	0.748	0.851
	(97.53)	(8.88)	(8.85)	(6.09)	(5.94)
SentRes	-0.018	-0.047		-0.044	-0.058
	(-4.19)	(-5.84)		(-5.14)	(-3.14)
SentResPos			-0.032		
			(2.75)		
AbsSentResNeg			0.077		
			(4.13)		
VIX				-0.004	
				(-4.34)	
FEARS					0.925
					(0.90)
Log(TNA)		0.015	0.015	0.015	0.015
		(1.97)	(1.96)	(2.08)	(1.90)
$[Log(TNA)]^2$		-0.002	-0.002	-0.002	-0.002
		(-3.50)	(-3.50)	(-3.63)	(-2.72)
Tracking Error		1.402	1.420	1.771	2.583
		(11.23)	(11.28)	(10.02)	(7.42)
Comove		-0.045	-0.047	-0.010	-0.063
		(-1.44)	(-1.54)	(-0.21)	(-1.68)
Time Trend	-0.001	-0.001	-0.001	-0.0001	-0.004
	(-7.80)	(-1.66)	(-1.79)	(-0.24)	(-3.12)
Adj R^2	0.023	0.214	0.217	0.257	0.344
No. of fund-quarter observations	51,312	51,312	51,312	47,939	17,621
Sample period	1985Q1-2009Q3	1985Q1-2009Q3	1985Q1-2009Q3	1990Q1–2009Q3	2004Q3-2009Q3