The Role of Market Sentiment in Asset Allocations and Stock Returns

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Abstract

Retail investors respond to changes in market sentiment by trading directly stocks and, more importantly, by allocating their investments among mutual funds. We hypothesize that firms favored by mutual funds are more vulnerable to market sentiment. Consistently, we find that portfolios with higher correlation with sentiment contain more stocks that are large-cap, dividend payers, owned by institutions, and found in the S&P 500. We construct a factor representing sentiment risk. The sentiment factor is significant in standard asset pricing models and robust to various sorting procedures.

JEL Classification: G02, G12, G14
Keywords: Mutual fund flows; Risk preference; Market sentiment; Asset pricing; Factor models; Cross section of stock returns

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“Forget the dot-com boom with its irrational exuberance and the real estate bubble that was supposed to be invincible: Current market sentiment eclipses all of that”

— CNBC, March 1 2017

I. Introduction

Sentiment distorts investors’ objective beliefs about future cash flows, and thus distorts their investment decisions. Specifically, investors demand more (less) risks when they are optimistic (pessimistic). Therefore, risky assets are not properly priced in times of extreme sentiment level. There is a prevailing consensus in academia that stocks with high retail concentration, i.e., small stocks, young stocks, and stocks with low institutional ownership, or stocks of firms in financial distress are disproportionately sensitive to market sentiment.¹

This view, however, fails to consider the mutual funds as another channel through which market sentiment may affect demand for stocks. If market sentiment does result in correlated trading behavior of investors, we should expect this effect to emerge not only in direct stock trading in the market, but also in the investment allocation decisions among mutual funds. In fact, considering the size of mutual fund industry, the latter could represent a dominant channel. According to the Investment Company Fact Book (2016), the assets managed by mutual funds totaled nearly $16 trillion at year-end 2015, and households (retail investors) held not only 89% of those assets but also 95% of all long-term mutual fund assets. Therefore, mutual fund flows,

that is, indirect stock trading, arguably represents a crucial, but underrated venue through which market sentiment affects asset prices.

In this study, we examine the mutual fund flow channel through which sentiment might affect cross-sectional asset prices. Our analysis consists of two parts. First, we investigate whether individual investors adjust their investments among different mutual fund classes in response to changes in market sentiment. Second, we create a market sentiment factor similar to the momentum factor built in Carhart (1997) and analyze its significance in explaining portfolios sorted on various characteristics.

In the first part of our analysis, we find that a one percentage point increase in market sentiment is associated with a 4.5 basis point increase in net flows for equity funds and a 2.9 basis point decrease for money market funds. The net flows for other fund classes that have intermediate levels of risk range from –2.9 basis points to 4.5 basis points. These results are consistent with the literature in both psychology and economics that studies the relation between mood and risk-preference. For example, Carton et al. (1992) find that depressed subjects have lower sensation-seeking scores than normal subjects, indicating higher risk aversion. Felton, Gibson and Sanbonmatsu (2003) find differences in investment decisions of males with different levels of optimism. Gibson and Sanbonmatsu (2004) show the effect of optimism on risk taking in gambling situations. Other studies (Harmatz et al. (2000), Kramer and Weber (2012) and Bassi, Colacito and Fulghieri (2013)) show the effect of seasonal depressive mood on individual risk preferences.

The connection between market sentiment and mutual fund flows has been addressed in previous literature. These studies suggest that mutual fund flows proxy for sentiment but fails to

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2 Sensation seeking, also called excitement seeking, is a personality trait defined by the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience (see Zuckerman (1994), p. 27).
quantify the effect of sentiment on flows. For example, Warther (1995) uses discounts on closed-end funds as a measure of investor sentiment but finds no connection between fund inflows and sentiment. Indro (2004) finds that net aggregate equity fund flow in the current week is higher when individual investors become more bullish in the previous and current weeks. Ben-Rephael, Kandel and Wohl (2012) use transfer flows between bond and equity funds within a fund family to proxy for investor sentiment, and find them to be significant in explaining contemporaneous market returns. Wang and Young (2016) investigate the relation between terrorist attacks and mutual fund flows, and observe a significant hike in fund movements during the post-attack month into the safety of money market and bond funds, and away from equities. When controlling for market sentiment, the significance of their results disappears, suggesting that sentiment can indeed capture the dynamics of completely exogenous events. Kamstra et al. (2017) show that seasonal depression affects investors’ risk preferences, and thus their asset allocation decisions. In contrast to this literature, we investigate how a marginal change in sentiment exerts influence on retail investors’ asset allocation decisions between fund categories.

One noteworthy implication from our results on fund flows is the systemic role that market sentiment plays in equity pricing. We show that a one-standard-deviation increase in market sentiment is associated with an increase in net flows of roughly 47.5 basis points for equity funds. In percentage terms, this seems rather small, but in dollar terms it is approximately $14 billion, creating huge buying pressure for stocks in mutual fund portfolios. Ben-Rephael, Kandel and Wohl (2011) study the relationship between net daily mutual fund flows and the returns of the Tel Aviv 25 index (the index of 25 largest stocks in Israel). They conclude that a shock to fund flows is related to a positive contemporaneous price impact that is subsequently reversed.
The temporary price pressure brought on by market sentiment could affect contemporaneous stock prices and returns, even in the absence of any fundamental information about future earnings. Not all stocks, however, are affected by these sentiment-induced changes in flows the same way. Pollet and Wilson (2008) report that “a doubling of fund size is associated with an increase in the number of stocks of just under 10%”, suggesting that fund managers tend to adjust their holdings in existing positions rather than to open new positions in response to changes in flows. Considering that the mutual fund industry holds nearly $16 trillion in assets, and that most equity funds hold primarily large and liquid stocks, it is not surprising that these stocks are most vulnerable to the temporary price pressure resulting from mutual fund flows. Therefore, our hypothesis predicts that firms favored by mutual funds are more likely to be affected by the change in market sentiment.

In the second part of our analysis, we investigate the predictions of the sentiment-induced temporary price pressure hypothesis. We first build ten portfolios based on the correlations between stock returns and market sentiment and compare the average firm characteristics explicitly. Consistent with our prediction, we find evidence that high-correlation portfolios generally have greater representation of large-cap stocks, dividend payers, repurchasers, firms with high institutional holdings, and those included in the S&P 500 index.

To investigate the potential of market sentiment to explain cross-sectional stock returns, we follow the method of Carhart (1997) and form a sentiment factor, SENT, which captures the return premiums of portfolios with high and low correlations to market sentiment. We find that the addition of SENT to standard asset pricing model increases the explanatory power of the models and at the same time reduces the explanatory power of other risk factors, including book-to-market, operating profitability, investment, and momentum.
Finally, as part of robustness tests, we test and show that the significance of SENT persists across various model settings and is robust to a variety of sorting procedures. More importantly, we find that large-cap stock portfolios and high institutional ownership portfolios exhibit positive and significant loadings on SENT, while the small-cap portfolios and low institutional ownership portfolios show negative and significant loadings. These results strongly support the prediction of our hypothesis that sentiment induces temporary price pressure through mutual fund flows.

Our findings run counter to previous literature as well as the conventional wisdom, which asserts that stocks with greater arbitrage risks, for example, young, small, and illiquid stocks, are more vulnerable to the change in market sentiment. Baker and Wurgler (2006) find that young stocks, small stocks, unprofitable stocks, high-volatility stocks, and distressed stocks are not properly priced after periods of high sentiment. Baker, Wurgler and Yuan (2012) show similar findings in global markets. Using a large data set of retail trades from a major US discount brokerage, Kumar and Lee (2006) find that retail investor sentiment has incremental explanatory power for small stocks, value stocks, stocks with low institutional ownership, and less expensive stocks. Lemmon and Portniaguina (2006) use consumer confidence as a measure of investor optimism and find that it exhibits forecasting power for returns on small-cap stocks. Antoniou, Doukas and Subrahmanyam (2016) argue that high beta stocks become overpriced in optimistic periods, but during pessimistic periods, noise trading is reduced, so that traditional beta pricing prevails. However, based on the evidence that we provide on fund flows, we argue that our results are consistent with the fact that the major players in the market are institutions rather than retail investors.

The remainder of this paper is organized as follows. Section I describes the data and presents summary statistics. Section II presents our main findings on mutual fund flows. Section
III describes the construction of the sentiment factor and presents the regression results. We conclude in Section IV.

II. Data and methodology

Our data are derived from several sources. Data on fund flows are from the Investment Company Institute, the market sentiment from Investor Intelligence, security returns from the Center for Research in Securities Prices, firm characteristics from Compustat, institutional holdings from the Thomson Reuters database, and asset pricing factors from the Kenneth R. French’s data library. In the following paragraphs, we describe the data in detail.

A. Fund flows

We obtain monthly data on aggregate fund flows from the Investment Company Institute (ICI). The ICI data set consists of 33 mutual fund categories from January 1984 to December 2014. For each fund category, ICI reports the aggregated value of sales, redemptions, exchanges in, exchanges out, reinvestment distributions, and total assets. For the most part, we follow the groupings of Kamstra et al. (2017) to aggregate the 33 fund categories into equity, hybrid, corporate, municipal, government bonds, and finally money market funds. We employ net flows to test if investors are, in fact, pulling their money from riskier asset classes and moving it into lower-risk fund classes when facing a change in market sentiment.

Of those six fund classes, money market and government fixed-income funds are considered to be relatively safe, while equity funds are riskier. We consider the remaining three classes, hybrid, corporate fixed income, and municipal fixed income, to have intermediate risk levels. Estimated monthly net flows (NetFlows) are defined as follows:
We calculate fund category returns for month \( t \) and category \( i \) as

\[
R_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1} - NetFlows_{i,t}}{TNA_{i,t-1}}. 
\]  

(2)

Following Kamstra et al. (2017), we include as control variables capital gain overhangs calculated as the cumulative realized returns since the previous November; the logarithm of total net assets; monthly returns on the Center for Research in Securities Prices (CRSP) value-weighted market portfolio, including all distributions; the change in the Consumer Price Index (CPI); the return on a five-year Treasury note; and personal saving rates, as reported by the Bureau of Economic Analysis (BEA).

Panel A of Table I reports summary statistics of the aggregate fund flows and macroeconomic control variables. Panel B describes the fund flows in detail for each asset class. Prior studies, such as Warther (1995) and Griffin, Nardari and Stulz (2004) suggest that fund flow is autoregressive, so we report the results of partial correlations in columns (5) – (8). Among all six asset classes, equity, hybrid, and corporate fixed income are AR(3) processes, while municipal fixed income, government fixed income, and money market funds are AR(4) processes. All autocorrelations vanish within four lags, consistent with existing literature.

--------- Insert Table I ---------

B. Market sentiment

Market sentiment, variously called investor sentiment, is not a mere reflection of market conditions, nor is it entirely endogenous to the investment process. Changes in fundamentals, such
as GDP or interest rates, affect market sentiment undoubtedly. Changes in non-fundamental factors, such as losses in soccer matches (Edmans, García and Norli (2007)), aviation disasters (Kaplanski and Levy (2010)), and even solar activities (Raps, Stoupel and Shimshoni (1992) and Kay (1994)), could affect market sentiment as well.

Baker and Wurgler (2007) define market sentiment as “a belief about future cash flows and investment risks that is not justified by the facts at hand.” The market sentiment index devised by Baker and Wurgler (2006, BWI hereafter) has been widely recognized. It is constructed by calculating the first principal component of six sentiment proxies: closed-end fund discount; lagged NYSE share turnover; number of IPOs; lagged average first-day returns on IPOs; equity share in new issues; and lagged dividend premium. By orthogonalizing the six raw proxies on macroeconomic variables, BWI is separated from the business cycle component.

We use the weekly Advisors’ Sentiment Report from Investors Intelligence (II) to calculate our investor sentiment measure for the period from 1967 to 2014. To be specific, we use the ratio of percentage of bullish advisors over the sum of bullish and bearish advisors as our investor sentiment proxy. Though both our sentiment measure, II, and BWI capture the variation of market sentiment, we choose II rather than BWI for several reasons. First, II captures real-time market sentiment while BWI necessitates lagged variables and thus reflects the rough sentiment over a relatively long period. For every week, II compiles more than a hundred market reports from multiple sources and assesses the stance of each as bullish, bearish, or correction (neutral). In contrast, three out of those six monthly proxies used in BWI are in lagged form. Further, some proxies, notably, the number of IPOs and new equity issues, are usually determined through a time-consuming process and reflect investors’ lagged opinions about the market. Although there is not a formal definition of market sentiment, market sentiment as interpreted throughout the
literature is not only a gauge of contemporaneous market condition, it should also reflect investors’ expectation about future market movement. However, because of the lagged structure, BWI might fail to capture the future expectations.

To verify our conjecture, we first obtain data on three composite economic indexes from Bloomberg and estimate the pairwise correlations between BWI, II, economic indexes, and growth in the indexes. The set of indexes is assembled by the Conference Board and consists of lagging, coincident, and leading economic indexes. The leading, coincident, and lagging economic indexes are essentially composite averages of several individual leading, coincident, or lagging economic indicators. All components are averaged and standardized for the purpose of equalizing volatility\(^3\). The results are reported in Panel A of Table II. We find that II is significantly correlated with both the value of economic indexes and growth in the indexes, while BWI is not significantly related to the growth in the leading economic index.

------------ Insert Table II ------------

Second, as shown in Panel B, we obtain excess market return data from Kenneth R. French’s data library and find that II is positively and significantly correlated with current and past market returns, while BWI is negatively correlated with both current and past market movements. The results of II are more consistent with the studies on positive feedback investors and extrapolation on past returns (e.g., Cutler, Poterba and Summers (1990), De Long et al. (1990b), and Lakonishok, Shleifer and Vishny (1994)). The results of II are also similar to Greenwood and

Shleifer (2014), in which the authors find a positive correlation between six measures of market sentiment and past returns.

Third, we show in Panel C that II captures some non-fundamental components in market sentiment. In addition to the above mentioned literature of influences of terrorist attacks and daylight change on investor mood, solar activities are also found to be related to investor mood. Specifically, geomagnetic storms, caused by coronal mass ejections by the sun, have been found to have ubiquitous effects on mood disorders. For example, Raps, Stoupel and Shimshoni (1992) report significantly negative correlations between admissions of psychiatric patients and magnetic disturbance measures such as sudden magnetic disturbances of the ionosphere (−0.274) and the index of geomagnetic activity (−0.216). Kay (1994) shows a significant increase in hospital admissions with a diagnosis of depressive illness following geomagnetic storms compared to geomagnetically quiet control periods.

In Panel C we estimate the pairwise correlations between BWI, II, number of terrorist attacks and geomagnetic activities. If BWI and II capture market sentiment, we should expect sentiment to be negatively associated with number of terrorist attacks and with geomagnetic activities. We obtain the number of terrorist attacks that happened on U.S. soil over 1970 to 2015 from the Global Terrorism Database produced by the National Consortium for the Study of Terrorism and Responses to Terrorism. We use two measures to proxy the intensity of geomagnetic activities, storm sudden commencement (SSC) and monthly mean of the overall strength of geomagnetic storm (GMS), both of which are downloaded from the National Geophysical Data Center and covers the time span from 1970 to 2011. The results with II are as expected: II is negatively and significantly correlated with all three mood-depressing variables, that is, −0.12 with
number of terrorist attacks, –0.13 with SSC and –0.08 with GMS, while the results with BWI are not consistent with our expectations as the relation is either insignificant or positive.

An informative market sentiment measure should be able to capture both fundamental and non-fundamental components. In this regard, II clearly dominates BWI. Although the tests are parsimonious, we believe that the evidence presented above is adequate to justify the use of II because 1) it provides timely estimates of market sentiment and enables us to track the influence of a marginal change in investor sentiment on fund flows. BWI cannot do this because of its lag structure; 2) it captures both fundamental and non-fundamental components in market sentiment.

C. Stock returns and firm characteristics

To investigate the ability of market sentiment to explain cross-sectional stock returns, we obtain CRSP securities data from July 1967 to December 2014. Our sample includes monthly NYSE, Amex, and Nasdaq securities data (share codes 10 and 11). The CRSP provides monthly data on stock prices, shares outstanding, trading volume, stock returns, and returns on the S&P 500. For inclusion in the monthly analysis, a stock must satisfy the following criteria: First, for June of every year, it must have a four-year history in CRSP. Second, it must have fewer than 24 missing values from its previous 48 monthly returns before the portfolio formation. This mitigates any issues related to survivorship bias inherent in CRSP for performance-related delisted firms, as stated by Shumway (1997), and Shumway and Warther (1999), and enables us to measure correlations over a meaningful period. The criteria also limit the number of firms available in our sample data to 15,276 but still leaves a considerable sample size for a meaningful empirical analysis.
Firm-level financial data come from the Compustat standardized databases of Global Market Intelligence. Following Fama and French (1992), we merge Compustat’s firm-level data with the data from CRSP, using CUSIP, ticker, and company name variables. A firm’s stock returns for the period from July of year \( t \) to June of year \( t+1 \) are matched and merged with its accounting data for the fiscal year ending in year \( t-1 \). Data for the total institutional holdings and ownership concentration, measured by the Herfindahl-Hirschman Index (HHI), come from the Thomson Reuters (13F) database. We obtain the monthly returns on factor portfolios—market risk premium (MRP), size factor (SMB), value factor (HML), profitability factor (RMW), investment factor, (CMA), momentum factor (MOM), and risk-free rates—from 1967 to 2014 from Kenneth R. French’s data library.

### III. Market sentiment and flow of funds

We start our analysis by examining the relation between market sentiment and mutual fund flows. We investigate the effect of the change in market sentiment on asset allocation decisions of retail investors. We also study whether the effect is the same under high and low sentiment levels.

#### A. Fund flows under different sentiment levels

To study the relation between change in sentiment and mutual fund flows, we divide the entire time span, February 1984 to December 2014, into periods of either increasing or decreasing sentiment, depending on whether the current period’s sentiment level is higher or lower than the previous period’s. We use monthly data on mutual fund flows and monthly average of market sentiment (calculated as an arithmetic average from the weekly observations). Panel A of Table III reports the average estimated net flows for all fund categories for those two sentiment regimes.
Prior literature, such as Gomes and Michaelides (2005) and Peng and Xiong (2006), suggests that retail investors are risk averse and reallocate more money into safer funds when their optimism about the stock market dampens. Consistent with this view, we find greater net flows into corporate, municipal, government fixed-income funds, and money market funds during periods of decreasing sentiment, and greater net flows into equity and hybrid funds during periods of increasing sentiment. The differences in average flows between increasing and decreasing sentiment periods range from 1.2 basis points for hybrid funds to 33.1 basis points for government fixed-income funds. The differences in average flows for these funds are insignificant, except for government fixed-income funds. The signs though, are as expected. Panels B and Panel C report the average inflows and outflows for each asset class.

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B. Fund flows and market sentiment

Table IV presents the baseline regression results of fund flows, based on the change in market sentiment (ΔSentiment). Given the considerable autocorrelation reported in Table I, we incorporate one-, two-, and three-month lagged flows into the model to control for the autocorrelation. Large autocorrelations are expected since a large portion of mutual fund investments are made through employer-sponsored retirement plans. The nature of these flows is independent of investor sentiment and therefore can be predicted from previous flows. All control variables are lagged by one month to avoid endogenous mutual fund investment decisions.

--------- Insert Table IV---------

--- Footnotes ---

4 The results are qualitatively unchanged if we control for four lags of dependent variable.

5 80% of mutual-fund owning households had accounts with employer-sponsored plans in 2015 according to the 2016 Investment Company Fact Book.
Panel A uses net flows as a dependent variable. We find in column (1) (equity funds) and column (6) (money market funds) that a one percentage point increase in ΔSentiment results in an increase of 4.5 basis points in net flows into the former and a decrease of 2.9 basis points into the latter. The results are consistent with the preliminary findings in Table III and confirm the positive relation between optimism and risk-seeking behavior, meaning that an increase in optimism induces investors to be less risk averse and thus to invest more in equity funds and less in money market funds. The coefficients of ΔSentiment for intermediate-risk fund classes range from 0 to 2.0 basis points. Two explanations are possible for the loss of significance on money market funds. First, institutional investors hold a large portion of the assets in money market funds (around 40% in 2015 according to the 2016 Investment Company Fact Book), and they are relatively less sensitive than retail investors to changes in market sentiment. Second, the financial assets in money market funds usually have very short maturities. The data with a monthly frequency may not entirely capture the influence of market sentiment on the investors of money market funds.

Panel B uses inflows as the dependent variable. We find that for a one percentage point increase in market sentiment, equity funds experience a significant 2.9 basis point increase in inflows, while money market funds experience an insignificant decrease of 6.4 basis points in inflows. In Panel C, we find that an increase in market sentiment is associated with a significant drop in outflows from equity funds. The effect on money market funds is negative but not significant. Overall, the results in Table IV again confirm our hypothesis that a change in market sentiment affects risk preferences and corresponding asset allocation decisions.
C. Marginal effects of the change in market sentiment

Professional traders often view investor sentiment as a contrarian indicator and engage in trading activities that correct asset mispricing, especially when the market is under extreme optimism or pessimism. However, it is not clear if retail investors (noise traders) exhibit the same behavior. Namely, do they know when sentiment levels are high? Therefore, we add a high-sentiment dummy to the regression model to investigate whether a similar change in market sentiment exerts the similar impact on fund flows under different sentiment levels. High-sentiment dummy equals one if the current sentiment level is greater than the median, and zero otherwise.

The results in Table V suggest that investors under different levels of sentiment respond differently to changes in sentiment. On average, a one percentage point increase in market sentiment during low-sentiment periods is associated with an increase of 5.1 basis points in unexpected net flows for equity funds; an increase of 2.5 basis points for municipal fixed-income funds; a decrease of 1 basis point for government fixed-income funds; and a decrease of 7 basis points for money market funds. A one percentage point increase during the high-sentiment periods results in much smaller unexpected net flows of 3.7 basis points for equity funds and 0.6 basis points for municipal funds. The influence of ΔSentiment during a same high-sentiment period show opposite results for government fixed-income funds and money market funds. Following an increase of one percentage point in ΔSentiment, both fund classes show increases, rather than decreases, in net flows.

--------------- Insert Table V ---------------
In short, our further results highlight the nonlinear nature of sentiment. We show that investor sentiment has a diminishing effect on risk-seeking behavior as the sentiment accrues to higher levels.

D. Sentiment Effect through Mutual Funds Flow Channel

These results support our hypothesis that sentiment influences stock returns through the funds flow channel. A one-standard-deviation increase in market sentiment induces an average increase in net flows of roughly 47.5 basis points for equity funds, or approximately $14 billion, creating huge buying pressure for portfolios held by mutual funds. Since mutual funds usually hold large and intensively studied companies, we hypothesize that the firms most affected by sentiment-induced demand are large and liquid companies with high institutional ownership. In addition, the pressure from buying and selling should result in increased volatility for these firms.

This prediction differs from Baker and Wurgler (2006), which shows that returns of small, young, and growth firms, in particular, are affected by market sentiment. The difference is primarily due to the different methodologies employed to create the sentiment measures. Baker and Wurgler base their measure on a number of sentiment proxies with lagged structures and low frequency levels. Our sentiment measure, on the other hand, reflects the latest opinions of investors and enables us to capture contemporaneous changes in investor sentiment. We believe that this measure, as an indicator of current sentiment, contains timely and more relevant information about subsequent stock returns.
IV. Market sentiment and cross-sectional stock returns

In this section, we test the prediction that the large, dividend-paying firms with high institutional ownership are those most affected by sentiment-induced demand, and explore the possibility of using market sentiment as a factor in explaining cross-sectional stock returns. We build ten portfolios based solely on the sensitivity of stock returns to market sentiment, and look into the average firm characteristics in each portfolio. We then construct a risk factor using these risk-mimicking portfolios and test whether this factor helps to explain stock returns.

A. Portfolio construction

To build ten sentiment portfolios, we use our sample data over 1967 to 2014 and calculate the correlations between returns of individual stocks and our market sentiment variable, II. We use 48 monthly returns to calculate the correlations. Starting in 1971, in June of every year $t$, we rank all the stocks in the sample by correlation in ascending order. We then split the sample into deciles and form ten equally weighted portfolios, based on their correlation rankings. Although we could report results using a value-weighted scheme, we choose equally weighted portfolios for the primary reason that value-weighted returns place a heavier emphasis on the size of the stock. Also, the value-weighted measure is sensitive to within-portfolio changes in the stock price distribution (Kumar and Lee (2006)).

After the portfolios are formed, we move to the following year and calculate the monthly excess returns for each by subtracting one-month T-bill rate from portfolio returns. The top portfolio, Portfolio 10, has the highest correlation with market sentiment, and the bottom portfolio, Portfolio 1, has the lowest. To capture more detailed dynamics, we further divide the top and
bottom portfolios, Portfolios 1 and 10, into thirds, where A denotes the lowest sensitivity and C
denotes highest sensitivity to market sentiment.

Panel A of Table VI presents the average firm characteristics for the ten portfolios. At the
end of June, we calculate the cross-sectional average of firm characteristics and report the statistics
of a time-series average. A description of the variables is as follows: Market equity (ME) is
measured as price times shares outstanding from CRSP. BE is the book value of stockholders’
equity plus deferred taxes and the investment tax credit (if available), minus the book value of
preferred stock. Book-to-market, or B/M, ratio is computed as book equity (BE) for the fiscal year
ending before June divided by ME (price times shares outstanding at the end of December of year
\( N - 1 \)). The book value of preferred stock is estimated with redemption, liquidation, or par value,
depending on availability. R&D expense is scaled by sales.

--------------- Insert Table VI ----------------

Following Fama and French (2015), we define operating profitability as annual revenues
minus the cost of goods sold, interest expense, and selling, general and administrative expenses,
divided by book equity for the last fiscal year end in \( t-1 \). We define investment as the change in
total assets from the fiscal year ending in year \( t-2 \) to the fiscal year ending in \( t-1 \), divided by \( t-2 \)
total assets. Age is the number of years since the firm’s first appearance on CRSP. Dividend payout
means dividends paid out per share divided by earnings per share. The dividend payer dummy
equals one if the firm has paid dividends before June of year \( t \), and zero otherwise. The repurchase
yield is measured as the dollar value of the repurchase of common and preferred stocks, scaled by
ME in December of year \( t-1 \). A repurchaser dummy is defined in the same way as a dividend
payer dummy. We also report the average short interests, and short interests adjusted for stock
splits, scaled by shares outstanding. S&P 500 firms is defined as the average number of firms listed
on the S&P 500 in each portfolio. Turnover is the monthly trading volume divided by shares outstanding.

Panel A of Table VI shows that Portfolio 1 has the lowest correlation with the market sentiment variable, II, at –0.04. Portfolio 10 has the highest correlation, at 0.42. In general, high-sensitivity firms are larger in size than low-sensitivity firms. Also, the median firm size of Portfolio 10 is triple the size of Portfolio 1. We don’t see any clear pattern in terms of B/M, R&D expense, investment, dividend payout, repurchase yield, or short interests. However, we do see monotonic increases across portfolios in age, operating profitability, dividend payers, repurchasers, institutional holdings, S&P 500 firms, and turnover. The results may seem counterintuitive at first, but they do support our hypothesis that firms favored by mutual funds are vulnerable to market sentiment. The high proportion of large companies with large institutional holdings in high-correlation portfolios suggests that sensitivity to sentiment is indeed related to the demand created from the mutual fund industry. Higher turnover in high-correlation portfolios is also consistent with swing in sentiment-induced demand.

Panel B of Table VI reports the average monthly excess returns of our portfolios. We see the returns range from 0.88 to 0.99, and the differences are insignificant. Though we find no systemic patterns with regard to the excess returns, we do find that the standard deviation of monthly excess returns increases across the ten portfolios. This evidence supports the sentiment-induced temporary price pressure hypothesis as it suggests that portfolios with higher sensitivity to market sentiment suffer more price deviation.

We use the II sentiment measure to classify the entire time span into increasing (decreasing) sentiment periods if the sentiment level is higher (lower) than previous month. Of all 522 monthly observations, 259 are classified as increasing sentiment periods and 263 as decreasing sentiment.
periods. Their distribution is almost even in the sample. Panel B of Table VI reveals a strong variation in average returns across the ten portfolios. In periods of increasing sentiment, the monthly excess returns increase almost monotonically, with sensitivity to market sentiment. The excess returns range from 3.09% for Portfolio 1 to 3.66% for Portfolio 10. In periods of decreasing sentiment, we find an opposite trend that the portfolios’ excess returns exhibit a monotonically decreasing pattern with sensitivity. For instance, Portfolio 1 has a monthly excess return of –1.19%, while Portfolio 10 only –1.70%. Our unreported results for extreme portfolios show even larger spread. Portfolios 10C that contains the top one third of highest-sensitivity stocks outperforms (underperforms) Portfolio 1A that contains the bottom one third of lowest-sensitivity stocks by 108 (69) basis points in increasing (decreasing) sentiment periods. These patterns suggest a predictable relationship between portfolio excess returns based on correlation and market sentiment.

B. Construction of the market sentiment factor

We follow the Carhart (1997) method in building momentum factor to construct our market sentiment factor, SENT. We sort firms on correlation with II into three portfolios, using breakpoints of 30% and 70%. For each month, we define SENT as the difference in equal-weighted portfolio excess returns between the top and bottom portfolios. Table VII reports average monthly returns and pairwise correlation for the factor portfolios: MRP, SMB, HML, MOM, RMW, CMA and SENT. Column (1) in Panel A reports the monthly excess returns. In line with previous asset pricing research, excess returns of all factors except SENT are positive, with high variances. This is indicative of the considerable cross-sectional variations in portfolio excess returns that these variables can explain. Although the correlations among factors are significant, they are generally low except for the pair of HML and CMA. The correlation between them is 0.70 and is significant.
at 0.1%. The evidence supports Fama and French (2015), in which the authors point out that HML is a redundant factor.

The average monthly return on the SENT factor is \(-0.03\) and not significantly different from zero \((t\text{-statistic} = -0.33)\)\(^6\). Considering the patterns found in the sensitivity portfolios in the previous section, this can be explained by offsetting the positive returns in periods of increasing sentiment with negative returns in periods of decreasing sentiment. Panels B and C report the summary of the risk-mimicking portfolios in increasing- and decreasing-sentiment periods separately, and confirm our inference on the low excess returns on the SENT factor for the entire sample. The SENT factor is positive (0.32) and significantly different from zero \((t\text{-statistic} = 2.19)\) during periods of increasing sentiment and negative \((-0.36)\) and significantly different from zero during periods of decreasing sentiment \((t\text{-statistic} = -3.38)\). Even though the average monthly return on SENT is close to zero, it doesn’t necessarily mean the SENT factor is not incorporated in asset prices. On the contrary, the results indicate that SENT captures a short-term mispricing created by sentiment-induced mutual fund investments that is nulled out over periods of increasing and decreasing sentiment. For illustration, Figure I shows monthly averages by year of SENT in comparison with monthly averages of other asset pricing factors: MRP, SMB and HML. SENT fluctuates with similar magnitudes as other factors, especially since late 1990s, the period of large growth in mutual fund industry.

--- Insert Table VII ---

--- Insert Figure I ---

\(^6\) We also construct the SENT factor in different fashions, the results are qualitatively unchanged. For example, we form value-weighted portfolios instead of equal-weighted ones; we use NYSE stock breakpoints; we follow Fama and French (1993) and build six value-weighted portfolios on size and correlation, etc.
We also find that regardless of increasing or decreasing sentiment, the excess return on market (MRP) always plays a major role in asset pricing, consistent with the current body of literature. Similar to SENT, SMB shows opposite signs over increasing and decreasing sentiment periods. The excess returns on HML, RMW and CMA show that they contribute almost nothing in time of increasing sentiment but contribute tremendously in time of decreasing sentiment. This finding is consistent with Baker and Wurgler (2006). They argue that risks are not correctly priced when sentiment is high. MOM shows a much stronger effect in periods of decreasing sentiment than in periods of increasing sentiment. In contrast, the monthly returns on SENT are significant both statistically and economically across different sentiment regimes.

C. Are investors compensated for bearing sentiment risk?

In the last section we showed that on average the risk premium on sentiment risk factor, SENT is zero. One might conclude that sentiment is not priced and hence carries no importance in asset pricing. The question “Is sentiment risk priced?” can be effectively broken down into two separate questions: (1) “Does market sentiment affect asset prices?” and (2) “Are investors compensated for bearing sentiment risk?” This paper aims to answer the first question and our answer is yes. As we present earlier and will show in the following sections, SENT captures short-term mispricing that results from sentiment-induced mutual fund flows. It significantly explains returns of correlation portfolios and portfolios formed on size, book-to-market ratio, operating profitability, investment, and institutional ownership.

For the second question, however, the zero risk premium on SENT seems to suggest that in the long run investors are not compensated for bearing sentiment risk. This is consistent with the noise trader model proposed in De Long et al. (1990a). In this model, the authors formalize the
role of market sentiment in asset pricing. The model hinges on two crucial assumptions. The first is that change in sentiment leads to noise trading. The second is that arbitrageurs are risk-averse and have short horizons. As a result, arbitrageurs in fear of the unpredictability of noise traders’ sentiment limit their original arbitrage position. However, De Long et al. (1990a) also point out that as horizons of sophisticated investors increase, they trade more aggressively and push the price of risky asset closer to their fundamental values. In this case, even though the sentiment risk created by noise traders is not priced, it still creates extra volatility in asset prices. Their argument is consistent with our results in Panel B, Table VI. We show that though returns on correlation portfolios have no trend, the volatility of returns increases monotonically with sensitivity to market sentiment. Similarly, Sias, Starks and Tiniç (2001) show that returns on closed-end fund shares are more volatile than the returns on the underlying assets, and that fund shareholders do not earn returns greater than holders of the underlying assets. They argue accordingly that closed-end fund shareholders are not compensated for bearing sentiment risk created by noise traders.

Our results are also consistent with temporary price pressure hypothesis. Using a unique database of aggregate daily flows to equity mutual funds in Israel, Ben-Rephael, Kandel and Wohl (2011) find that mutual fund flows create temporary price pressure that is subsequently reversed. Ben-Rephael, Kandel and Wohl (2012) show that 85% (all) of the positive relation between the net exchanges of equity funds and aggregate stock market excess returns is reversed within four (ten) months. The evidence in Table VII provides partial support for the temporary price pressure hypothesis. Since the sentiment-induced temporary pressure is not based on fundamental information that directly affects future earnings, but rather on non-fundamental signals, it should not affect equilibrium prices in the long run. In the short run, however, the effect could be
significant. This explains why we see the economic significance of SENT at a monthly frequency or in an annual window, but not in longer windows of five years or above.

D. The sentiment factor in asset pricing

Next, we assess the pricing abilities of the sentiment factor, SENT, alongside other time-varying risk factors. We also report evidence comparing the asset pricing model with SENT as an additional risk factor to other standard asset pricing models. The baseline model examined in this section consists of six risk factors, in which the first five factors are those used in Fama and French (2015) and the sixth is the momentum factor proposed in Jegadeesh and Titman (1993) and Carhart (1997). To test the incremental explanatory power of SENT, we augment the baseline model with a seventh factor, the sentiment factor (SENT). Specifically, our factor model for portfolio $p$ is as follows:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_{1,p}MRP_t + \beta_{2,p}SMB_t + \beta_{3,p}HML_t + \beta_{4,p}RMW_t + \beta_{5,p}CMA_t + \beta_{6,p}MOM_t + \beta_{7,p}SENT_t + \epsilon_{p,t}. \quad (3)$$

We conduct tests on the ten portfolios formed on correlation with market sentiment over the entire sample period, as well as during periods of increasing and decreasing sentiment. Table VIII reports the estimates of sentiment-augmented factor model for each of the correlation-portfolios as well as the extreme portfolios. We find that the SENT factor loadings are significant at a 1% level across all portfolios except for Portfolio 7, which has the intermediate level of sensitivity to market sentiment. Consistent with our hypothesis, the low-sensitivity portfolios (Portfolio 1 – 6) generally have negative SENT loadings, while the high-sensitivity portfolios (Portfolio 7 – 10) have positive loadings. In addition, we observe large improvements in Adj-$R^2$.
in the sentiment-augmented model from the baseline model, especially for the low-sensitivity portfolios. For instance, the Adj-R²s increase by approximately 10% from 81.2% (74.7%) to 91.6% (86%) for Portfolio 1 (Portfolio 1A).

-------------- Insert Table VIII --------------

In unreported results for the baseline six-factor model, we see that the loading on MRP increases monotonically with the sensitivity to market sentiment, while the loadings on HML and MOM show a decreasing pattern. However, after we add the SENT factor, all patterns vanish. The coefficients of MRP are now close to one in the SENT-augmented model, as opposed to the baseline model in which the coefficients range from 0.81 for Portfolio 1A to 1.07 for Portfolio 10C. The loadings on SENT loadings increase monotonically from –0.98 (–1.02) for Portfolio 1 (Portfolio 1A) and 0.39 (0.43) for Portfolio 10 (Portfolio 10C). It appears that only SENT shows this monotonic variation across portfolios that could explain the differences in excess returns. Additionally, in explaining the spreads between Portfolios 1 and 10, and between Portfolios 1A and 10C, we find that SMB, HML, RMA, CMA, and MOM lose most of their explanatory powers after we include SENT into the model, and that SENT is the only variable that remains significant in explaining the spreads. The Adj-R²s improve from 27.3% to 88.5% and from 25.0% to 69.8% for the spreads 10–1 and 10C–1A respectively, further demonstrating the incremental power of SENT in explaining the cross-section of returns.

We also perform the same test over sub-periods, namely increasing- and decreasing-sentiment periods in unreported analysis. For both sub-periods, we find similar results to our findings in Table VIII. The SENT factor created from the market sentiment variable, II, continues to be significant at the 1% level across all portfolios, except for Portfolios 6 and 7. Also, the Adj-R²s of the sentiment-augmented models show significant improvements from the four-factor
model, consistent with our findings from Table VIII. Similarly, the improvements weaken as the
correlation of returns with market sentiment increases. In explaining the spreads between
Portfolios 1 and 10, and between Portfolios 1A and 10C, other factors lose at least part of their
explanatory power after addition of the SENT factor.

We show in Table VII significant correlations between SENT and all other risk factors.
The results in Table VIII consistently show that the addition of SENT absorbs part of the
explanatory power of other risk factors. Taken together, these findings suggest that the explanatory
power of SENT lies not only in improving Adj-$R^2$s across different model settings, but also in its
interaction with other risk factors. Though it is beyond the scope of this study, our results speak to
a possibility of SENT being able to explain some long-lasting anomalies, for example, value
anomaly and momentum anomaly.

E. Robustness tests

The results documented so far suggest that the SENT factor has significant explanatory
power in the cross-section of portfolio returns. Further prescription for using the SENT factor is
conditional on whether the findings persist in a series of robustness checks. It is beyond the scope
of this study to augment all available asset pricing models with the SENT factor. However, we
examine the explanatory power of SENT in two other important asset pricing models: the Fama-
French three-factor model and the more recent Fama-French five-factor model.

Table IX reports the SENT loadings in sentiment-augmented three-, four-, and five-factor
models. Columns (1) and (3) show the incremental explanatory power of SENT in the Fama-
French three-factor model and five-factor model. Fama and French (2015) show evidence that the
value premium factor, HML, does not improve the explanatory power of the cross-section of

27
returns in their five-factor model because of its redundancy. They argue that dropping HML from the five-factor model to create a new four-factor model that captures market, size, profitability, and investment premiums retains the explanatory power of the value premium because HML appears to be a redundant factor, at least for US stock return data from 1963 to 2013. We omit HML in column (2) to verify the robustness of our results by augmenting the SENT factor in their new model.

--------------- Insert Table IX ---------------

If returns were completely unrelated to the market sentiment factor, after controlling for the market risk premium, size, and value premium, then the loadings across the portfolios would not capture any variation. For the most part, our findings suggest that market sentiment has significant explanatory power in asset pricing. In the regressions shown in Tables IX, the significance of SENT persists across almost all portfolios and despite including the profitability and investment factors in the traditional FF three-factor model. In unreported regression results of the benchmark models, we find improvements in Adj-R²s that are consistent with our earlier findings. In addition, SENT reduces the explanatory power of RMW and CMA, especially for high-sensitivity portfolios in terms of significance and magnitude. In sum, the findings from Tables IX suggest that the addition of market sentiment as an explanatory factor in pricing asset returns is persistent across frequently used asset pricing models.

Previous tests were carried out on portfolios formed according to their correlations with market sentiment. To ensure that these findings are not merely artifacts of our sorting procedure or our sample, we examine the pricing power of SENT on portfolios sorted by other firm characteristics. We obtain portfolios based on size, book-to-market ratio, operating profitability, and investment directly from the Kenneth R. French data library from 1971 to 2014. We also sort
firms by institutional holdings using our sample over 1980 to 2014 due to data availability. We report SENT loadings in Table X for these portfolios.

------------ Insert Table X --------------

Our hypothesis predicts that stocks favored by mutual funds are more vulnerable to market sentiment due to the sentiment-induced temporary price pressure. Table X shows supportive evidence. Column (1) reports the SENT loadings for size portfolios. We find that the SENT loading is positive and significant for most of the large-cap stock portfolios but negative and significant for the portfolio of the smallest size decile. Column (2), (3) and (4) show that low B/M portfolios, high operating profitability portfolios, and high investment portfolios have significantly more loadings on SENT. This is consistent with findings in the previous literature that mutual funds tend to hold past winners and sell past losers, where past winners are more likely to have low B/M and high operating profitability, and are more inclined to increase their capital investments (See Titman, Wei and Xie (2004)). Column (5) reports the loadings for portfolios sorted on institutional holdings. We see a monotonic increasing pattern in SENT loadings as institutional holdings increase. Portfolios with high institutional ownership (Portfolio 9 and 10) exhibit positive SENT loadings, while other portfolios with lower institutional ownership show negative and significant loadings. Further, in explaining the return spreads between the top and bottom portfolios, SENT shows significance at the 1% level in regressions of size, book-to-market, operating profitability, investment and institutional ownership portfolios.

V. Conclusion

This study examines the hypothesis that sentiment might affect the cross-sectional asset prices though the mutual fund flow channel. We find that following an increase in market
sentiment, investors increase their investments in riskier fund categories and reduce their investments in safer funds. A one percentage point increase in sentiment results on average in a 4.5 basis point increase in net flows into equity funds and a 2.9 basis point decrease in net flows into money market funds. We also investigate the nonlinearity of the influence of investor sentiment and find that while an increase in investor sentiment triggers risk-seeking behavior, those behaviors diminish once investor sentiment reaches very high levels.

Based on the sentiment-induced price pressure hypothesis, we expect that stocks favored by mutual funds are vulnerable to market sentiment. Consistently, we show that high-correlation portfolios generally have greater representation of large-cap stocks, dividend payers, repurchasers, firms with high institutional holdings, and those included in the S&P 500 index. We follow Carhart (1997) and construct a sentiment factor. The addition of a sentiment factor increases the factor models’ explanatory powers and reduces the explanatory powers of other risk factors, including book-to-market, operating profitability, investment, and momentum factors. Finally, we show that the significance of SENT persists across different model settings and is robust to a variety of sorting procedures. Consistent with our prediction, we find the SENT loadings are positive and significant for large-cap stock portfolios and high institutional ownership portfolios, while the loadings are negative for small-cap and low institutional ownership portfolios.

Although the SENT factor is significant in all asset pricing models, it has an average zero risk premium. This finding suggests that SENT captures mostly short-term mispricing. In the long run, asset prices still come back to the fundamentals, implying sentiment risk does not create long-lasting market inefficiency.

We emphasize the importance of looking at mutual fund flows to understand the role of market sentiment in asset pricing. Our results run counter to prior studies. We contend that market
sentiment is more strongly reflected in mutual fund flows rather than in direct stock trading because the majority of individual investors own equity assets indirectly through their shares in funds. In future research, it would be interesting to investigate scenarios when the direct channel dominates the indirect channel, or vice versa.
References


Table I

Summary Statistics

Panel A reports summary statistics of aggregate fund flows and macroeconomic control variables from February 1984 to December 2014. The fund return is the capital appreciation for that asset class. Assets are the total net assets in billions. Capital gain is the cumulative returns since the previous November. Personal saving is the monthly BEA personal saving rate. CPI is the change in consumer price index. Market return is the return on a value-weighted market portfolio from CRSP. Five-year Treasury is the annualized return on a five-year Treasury note. Panel B describes the net flows in detail for each asset class. Panel C describes the measure of market sentiment.

Panel A: Summary statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Standard Deviation</th>
<th>Min</th>
<th>Max</th>
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<tbody>
<tr>
<td>Net flow (%)</td>
<td>0.85</td>
<td>0.66</td>
<td>1.72</td>
<td>-5.20</td>
<td>20.47</td>
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<td>Fund return (%)</td>
<td>1.15</td>
<td>1.10</td>
<td>3.09</td>
<td>-23.42</td>
<td>21.74</td>
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<tr>
<td>Assets (in billions)</td>
<td>985.81</td>
<td>405.82</td>
<td>1430.99</td>
<td>8.70</td>
<td>8440.92</td>
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<tr>
<td>Capital gains (%)</td>
<td>9.13</td>
<td>5.93</td>
<td>15.07</td>
<td>-43.13</td>
<td>171.70</td>
</tr>
<tr>
<td>Personal saving (%)</td>
<td>6.13</td>
<td>5.95</td>
<td>1.97</td>
<td>1.90</td>
<td>11.20</td>
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<tr>
<td>CPI (%)</td>
<td>0.23</td>
<td>0.23</td>
<td>0.26</td>
<td>-1.77</td>
<td>1.38</td>
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<tr>
<td>Market return (%)</td>
<td>0.96</td>
<td>1.47</td>
<td>4.47</td>
<td>-22.54</td>
<td>12.85</td>
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<td>Five-year Treasury (%)</td>
<td>5.02</td>
<td>5.03</td>
<td>2.63</td>
<td>0.62</td>
<td>13.48</td>
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Panel B: Flow of funds into different asset classes

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<tr>
<th></th>
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<th>Mean %</th>
<th>Median %</th>
<th>Standard Deviation, %</th>
<th>Partial Autocorrelation</th>
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<td></td>
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<td>Lag 1</td>
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<td>Equity</td>
<td>371</td>
<td>0.58</td>
<td>0.46</td>
<td>0.85</td>
<td>0.571</td>
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<tr>
<td>Hybrid</td>
<td>371</td>
<td>0.97</td>
<td>0.69</td>
<td>1.27</td>
<td>0.776</td>
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<tr>
<td>Corporate bonds</td>
<td>371</td>
<td>1.25</td>
<td>1.16</td>
<td>1.21</td>
<td>0.767</td>
</tr>
<tr>
<td>Municipal bonds</td>
<td>371</td>
<td>0.85</td>
<td>0.63</td>
<td>1.45</td>
<td>0.790</td>
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<tr>
<td>Government bonds</td>
<td>371</td>
<td>0.83</td>
<td>0.42</td>
<td>2.54</td>
<td>0.518</td>
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<tr>
<td>Money market</td>
<td>371</td>
<td>0.64</td>
<td>0.46</td>
<td>2.25</td>
<td>0.149</td>
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Panel C: Descriptive statistics of market sentiment

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<thead>
<tr>
<th></th>
<th>Min</th>
<th>25%</th>
<th>Median</th>
<th>Mean</th>
<th>75%</th>
<th>Max</th>
<th>Std. deviation</th>
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<tr>
<td>Sentiment</td>
<td>32.01</td>
<td>52.85</td>
<td>61.40</td>
<td>60.38</td>
<td>68.75</td>
<td>84.88</td>
<td>10.55</td>
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Table II
Comparison of Sentiment Indexes

This table reports the comparison between the Baker and Wurgler (2006) sentiment index (BWI) and the Investor Intelligence sentiment index (II). Panel A reports the pairwise correlations between sentiment indexes and economic indexes and growth in the indexes. We obtain monthly lagging (Lag), coincident (Coin), and leading (Lead) economic indexes from the Conference Board over 1970 to 2015. dLag, dCoin, and dLead denote the growth over \( t-12 \) value respectively. Panel B presents the correlation coefficients between sentiment indexes and current and past market returns. \( R_{Mt} \) is the value-weighted market return in excess of one-month T-bill rate at month \( t \), downloaded from Kenneth R. French’s data library. Panel C reports the correlations between sentiment indexes and terrorist attacks and geomagnetic activities. \( N_{terror} \) is the number of terrorist attacks obtained from Global Terrorism Database produced by the National Consortium for the Study of Terrorism and Responses to Terrorism. SSC and GMS denote the number of storm sudden commencement and monthly mean of the overall strength of geomagnetic storms, respectively. *, **, and *** indicate significance at 10%, 5%, and 1% level, respectively.

### Panel A: Economic indexes

<table>
<thead>
<tr>
<th></th>
<th>BWI</th>
<th>II</th>
<th>Lag</th>
<th>Coin</th>
<th>Lead</th>
<th>dLag</th>
<th>dCoin</th>
<th>dLead</th>
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<tr>
<td>BWI</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>-0.19***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lag</td>
<td>0.18***</td>
<td>0.25***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Coin</td>
<td>0.20***</td>
<td>0.25***</td>
<td>0.99***</td>
<td>1.00</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Lead</td>
<td>0.20***</td>
<td>0.26***</td>
<td>0.93***</td>
<td>0.97***</td>
<td>1.00</td>
<td></td>
<td></td>
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<tr>
<td>dLag</td>
<td>0.17***</td>
<td>-0.14***</td>
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<td>0.24***</td>
<td>0.32***</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dCoin</td>
<td>0.13***</td>
<td>0.08*</td>
<td>-0.03</td>
<td>0.04</td>
<td>0.21***</td>
<td>0.44***</td>
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<tr>
<td>dLead</td>
<td>0.01</td>
<td>0.30***</td>
<td>-0.03</td>
<td>0.01</td>
<td>0.15***</td>
<td>-0.01</td>
<td>0.77***</td>
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### Panel B: Current and past market excess returns

<table>
<thead>
<tr>
<th></th>
<th>BWI</th>
<th>II</th>
<th>( R_{Mt} )</th>
<th>( R_{Mt-1} )</th>
<th>( R_{Mt-2} )</th>
<th>( R_{Mt-3} )</th>
<th>( R_{Mt-4} )</th>
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<tr>
<td>BWI</td>
<td>1.00</td>
<td></td>
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</tr>
<tr>
<td>II</td>
<td>-0.19***</td>
<td>1.00</td>
<td>-0.08*</td>
<td>0.38***</td>
<td>1.00</td>
<td></td>
<td></td>
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<tr>
<td>( R_{Mt} )</td>
<td>-0.06</td>
<td>0.32***</td>
<td>0.07*</td>
<td>1.00</td>
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<td></td>
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<tr>
<td>( R_{Mt-1} )</td>
<td>-0.05</td>
<td>0.23***</td>
<td>-0.03</td>
<td>0.07*</td>
<td>1.00</td>
<td></td>
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</tr>
<tr>
<td>( R_{Mt-2} )</td>
<td>-0.04</td>
<td>0.17***</td>
<td>0.02</td>
<td>-0.03</td>
<td>0.07*</td>
<td>1.00</td>
<td></td>
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<tr>
<td>( R_{Mt-3} )</td>
<td>-0.04</td>
<td>0.14***</td>
<td>0.01</td>
<td>0.02</td>
<td>-0.03</td>
<td>0.07*</td>
<td>1.00</td>
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### Panel C: Non-fundamental components in sentiment

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<thead>
<tr>
<th></th>
<th>BWI</th>
<th>II</th>
<th>( N_{terror} )</th>
<th>SSC</th>
<th>GMS</th>
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<tbody>
<tr>
<td>BWI</td>
<td>1.00</td>
<td></td>
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</tr>
<tr>
<td>II</td>
<td>-0.19***</td>
<td>1.00</td>
<td>-0.02</td>
<td>-0.12***</td>
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<tr>
<td>( N_{terror} )</td>
<td>-0.02</td>
<td>-0.12***</td>
<td>0.04</td>
<td>1.00</td>
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</tr>
<tr>
<td>SSC</td>
<td>0.13***</td>
<td>-0.13***</td>
<td>0.03</td>
<td>0.40***</td>
<td>1.00</td>
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<tr>
<td>GMS</td>
<td>-0.03</td>
<td>-0.08*</td>
<td>0.03</td>
<td></td>
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</table>
### Table III

**Flow of Funds Under Different Sentiment Regimes**

This table reports the average fund flows in two sentiment regimes: increasing and decreasing sentiment months over the period from February 1984 to December 2014. A month is in an increasing sentiment period if the sentiment level in the current month is higher than that in the previous month. The difference in average flows between two different sentiment regimes and the significance of the difference is also given.

<table>
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<tr>
<th></th>
<th>High risk</th>
<th>Medium risk</th>
<th>Low risk</th>
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<tbody>
<tr>
<td></td>
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<td>Hybrid</td>
<td>Corporate bond</td>
</tr>
<tr>
<td>Increasing</td>
<td>0.947</td>
<td>1.005</td>
<td>1.353</td>
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<tr>
<td>Decreasing</td>
<td>0.802</td>
<td>0.993</td>
<td>1.418</td>
</tr>
<tr>
<td>Inc–Dec</td>
<td>0.145</td>
<td>0.012</td>
<td>-0.065</td>
</tr>
<tr>
<td>(t)-statistic</td>
<td>1.541</td>
<td>0.126</td>
<td>0.407</td>
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Panel A: Net flows

<table>
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<tr>
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<th>Decreasing</th>
<th>Inc–Dec</th>
<th>(t)-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing</td>
<td>4.390</td>
<td>4.328</td>
<td>0.062</td>
<td>0.473</td>
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<tr>
<td>Decreasing</td>
<td>2.911</td>
<td>2.941</td>
<td>-0.030</td>
<td>-0.332</td>
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<tr>
<td>Inc–Dec</td>
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<td>4.832</td>
<td>-0.214</td>
<td>-1.349</td>
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<tr>
<td>(t)-statistic</td>
<td>3.478</td>
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<td>-0.163</td>
<td>-1.491</td>
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</table>

Panel B: Inflows

<table>
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<tr>
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<th>Decreasing</th>
<th>Inc–Dec</th>
<th>(t)-statistic</th>
</tr>
</thead>
<tbody>
<tr>
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<td>-0.881</td>
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<td>Inc–Dec</td>
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<tr>
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<td>2.559</td>
<td>2.595</td>
<td>-0.036</td>
<td>-0.558</td>
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Panel C: Outflows

39
Table IV
Regression of Net Fund Flows on Change in Sentiment

This table reports baseline regression results of aggregate flows on the change in market sentiment. The dependent variables in Panels A, B, and C are net flows, inflows, and outflows, respectively. Fund flows are scaled with lagged total net assets. ΔSentiment is the change in the market sentiment index. We include lagged dependent variables to control for autocorrelation. Fund return is the capital appreciation for month \( t \) and asset class \( i \). Assets are the logarithm of total net assets. Capital gain is cumulative realized return since the previous November. Market return is the monthly return on the CRSP value-weighted market portfolio, including all distributions. CPI is the change in the consumer price index. Treasury is the annualized yield on a five-year treasury note. Personal saving is the BEA monthly personal savings rate. All control variables are lagged by one period. We control for fund category fixed effects and year effects in each regression. Robust standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

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<tr>
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<th>Medium risk</th>
<th>Low risk</th>
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<tbody>
<tr>
<td></td>
<td>Equity</td>
<td>Hybrid</td>
<td>Corporate bond</td>
</tr>
<tr>
<td>ΔSentiment</td>
<td>0.045***</td>
<td>0.020***</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.005)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>Flow(_{t,1})</td>
<td>0.432***</td>
<td>0.335***</td>
<td>0.184**</td>
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<tr>
<td></td>
<td>(0.068)</td>
<td>(0.079)</td>
<td>(0.091)</td>
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<tr>
<td>Flow(_{t,2})</td>
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<td>0.091*</td>
<td>0.122**</td>
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<tr>
<td></td>
<td>(0.083)</td>
<td>(0.050)</td>
<td>(0.060)</td>
</tr>
<tr>
<td>Flow(_{t,3})</td>
<td>−0.016</td>
<td>0.213**</td>
<td>0.048</td>
</tr>
<tr>
<td></td>
<td>(0.058)</td>
<td>(0.087)</td>
<td>(0.066)</td>
</tr>
<tr>
<td>Fund return(_{t-1})</td>
<td>0.014**</td>
<td>0.054</td>
<td>−0.012</td>
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<tr>
<td></td>
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<td>(0.035)</td>
<td>(0.014)</td>
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<tr>
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<tr>
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<td>(0.101)</td>
<td>(0.357)</td>
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<td>Capital gain(_{t-1})</td>
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<td>−0.003</td>
<td>0.005</td>
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<tr>
<td></td>
<td>(0.001)</td>
<td>(0.004)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Market return(_{t-1})</td>
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<td>−0.019</td>
<td>−0.003</td>
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<tr>
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<td>(0.020)</td>
<td>(0.025)</td>
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<tr>
<td>CPI(_{t-1})</td>
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<td>0.151</td>
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<td></td>
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<td>(0.114)</td>
<td>(0.191)</td>
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<td>Treasury</td>
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<tr>
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<td>(0.083)</td>
<td>(0.210)</td>
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<td>Personal saving</td>
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<td>0.119*</td>
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<td>2656</td>
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<td>Adjusted R(^2)</td>
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<td>0.010*</td>
<td>-0.009</td>
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<tr>
<td>Flow_{t-1}</td>
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<td>0.342***</td>
<td>0.196**</td>
</tr>
<tr>
<td>Flow_{t-2}</td>
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<td>0.087**</td>
<td>0.154**</td>
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<tr>
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<td>-0.021</td>
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<td>-0.019</td>
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<tr>
<td>Adjusted R^2</td>
<td>0.678</td>
<td>0.577</td>
<td>0.246</td>
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</table>

Panel B: Inflows

<table>
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<th>High risk</th>
<th>Medium risk</th>
<th>Low risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔSentiment</td>
<td>-0.024***</td>
<td>-0.011***</td>
<td>-0.023***</td>
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<td>Flow_{t-1}</td>
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<td>0.386***</td>
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<td>0.145***</td>
<td>0.157***</td>
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<tr>
<td>Flow_{t-3}</td>
<td>0.162***</td>
<td>0.190***</td>
<td>0.156***</td>
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<td>-0.021***</td>
<td>-0.001</td>
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<td>-0.002**</td>
<td>-0.002**</td>
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<td>0.543</td>
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</table>
**Table V**

**Regression of Net Fund Flows on Change in Sentiment in Different Sentiment Regimes**

This table presents the influence of market sentiment on fund flows under different sentiment regimes. The dependent variables used in Panels A, B, and C are net flows, inflows, and outflows, respectively. Fund flows are scaled with lagged total net assets. ΔSentiment is the change in the level of the market sentiment index. A high-sentiment dummy equals 1 if the current sentiment level is greater than the median, and 0 otherwise. We include lagged dependent variables to control for autocorrelation. We control for fund category fixed effects and year effects in each regression. All other control variables are defined as in Table III. Robust Standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

<table>
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<th>High risk</th>
<th>Medium risk</th>
<th>Low risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equity</td>
<td>Hybrid</td>
<td>Corporate bond</td>
</tr>
<tr>
<td>ΔSentiment</td>
<td>0.051***</td>
<td>0.018***</td>
<td>0.010</td>
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<tr>
<td>ΔSentiment*</td>
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<td>0.006</td>
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<tr>
<td>Flow_{t,1}</td>
<td>0.432***</td>
<td>0.335***</td>
<td>0.183**</td>
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<tr>
<td>Flow_{t,2}</td>
<td>0.060</td>
<td>0.092*</td>
<td>0.122**</td>
</tr>
<tr>
<td>Flow_{t,3}</td>
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<td>0.213**</td>
<td>0.048</td>
</tr>
<tr>
<td>Fund return_{t,1}</td>
<td>0.014***</td>
<td>0.054</td>
<td>−0.012</td>
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<tr>
<td>Assets_{t,1}</td>
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<td>−0.125</td>
<td>−0.549</td>
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<td>Capital gain_{t,1}</td>
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<td>−0.003</td>
<td>0.005</td>
</tr>
<tr>
<td>Market return_{t,1}</td>
<td>−0.056***</td>
<td>−0.019</td>
<td>−0.003</td>
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<tr>
<td>CPI_{t,1}</td>
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<td>−0.119</td>
<td>0.151</td>
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<tr>
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<td>−0.328***</td>
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<tr>
<td>Adjusted R²</td>
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### Table V – continued

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<tr>
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<td>Equity</td>
<td>Hybrid</td>
<td>Corporate bond</td>
</tr>
<tr>
<td>ΔSentiment**</td>
<td>0.030***</td>
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<td>-0.010</td>
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<td>ΔSentiment*</td>
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<td>0.003</td>
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<td>0.343***</td>
<td>0.196**</td>
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<tr>
<td>Flowt-1</td>
<td>0.110</td>
<td>0.089*</td>
<td>0.154**</td>
</tr>
<tr>
<td>Flowt-2</td>
<td>0.052</td>
<td>0.226**</td>
<td>0.086</td>
</tr>
<tr>
<td>Flowt-3</td>
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<td>-0.005</td>
<td>-0.002</td>
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<td>-0.019</td>
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<td>-0.295</td>
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<tr>
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<tr>
<td>Adjusted R2</td>
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### Panel B: Inflows

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<th>Equity</th>
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<th>Municipal bond</th>
<th>Government bond</th>
<th>Money market</th>
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<td>-0.014***</td>
<td>-0.024***</td>
<td>-0.020***</td>
<td>-0.031**</td>
<td>-0.059</td>
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<tr>
<td>ΔSentiment*</td>
<td>0.013</td>
<td>0.007</td>
<td>0.002</td>
<td>0.017**</td>
<td>0.046**</td>
<td>0.092*</td>
</tr>
<tr>
<td>High sentiment</td>
<td>0.405***</td>
<td>0.347***</td>
<td>0.386***</td>
<td>0.320***</td>
<td>0.391***</td>
<td>0.184***</td>
</tr>
<tr>
<td>Flowt-1</td>
<td>0.248***</td>
<td>0.147***</td>
<td>0.157***</td>
<td>0.038</td>
<td>-0.067**</td>
<td>0.068*</td>
</tr>
<tr>
<td>Flowt-2</td>
<td>0.162***</td>
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<td>0.156***</td>
<td>0.121***</td>
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<td>0.395***</td>
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<td>Flowt-3</td>
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<td>-0.020***</td>
<td>-0.001</td>
<td>-0.015***</td>
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<td>0.204***</td>
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<td>0.386**</td>
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<td>-0.002**</td>
<td>-0.002</td>
<td>-0.001</td>
<td>-0.006***</td>
<td>-0.091***</td>
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<td>Market Returnt-1</td>
<td>0.029***</td>
<td>0.010**</td>
<td>-0.009</td>
<td>0.008</td>
<td>0.034**</td>
<td>0.105***</td>
</tr>
<tr>
<td>CPIt-1</td>
<td>-0.082</td>
<td>-0.166***</td>
<td>-0.068</td>
<td>-0.283**</td>
<td>-0.197</td>
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<td>Treasury</td>
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<td>-0.249***</td>
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<td>-0.066</td>
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<td>Personal saving</td>
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<td>-0.030*</td>
<td>-0.021</td>
<td>-0.030</td>
<td>-0.106</td>
<td>-0.333</td>
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<td>0.390</td>
<td>4.091***</td>
<td>2.279**</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Year FE</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>3158</td>
<td>1400</td>
<td>2656</td>
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<td>2064</td>
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<td>Adjusted R2</td>
<td>0.736</td>
<td>0.543</td>
<td>0.562</td>
<td>0.570</td>
<td>0.961</td>
<td>0.887</td>
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Table VI
Statistics of Portfolios Formed on Correlations With Market Sentiment: July 1967 to December 2014

Panel A reports the summary statistics of ten correlation portfolios. \( \rho \) is the correlation between return and market sentiment. ME and BE are market equity and book equity, respectively. R&D expense is scaled by sales. Operating profitability is the annual revenues minus the cost of goods sold, interest expense, selling, general and administrative expenses divided by book equity for the last fiscal year end in \( t-1 \). Investment is the change in total assets from the fiscal year ending in year \( t-2 \) to the fiscal year ending in \( t-1 \) divided by \( t-2 \) total assets. Dividend payout is scaled by earnings per share. Dividend payer dummy equals to one if a firm has paid dividends before June of year \( t \). Repurchase is the dollar value of the repurchase of common and preferred stocks scaled by ME in December of year \( t-1 \). Repurchasers are defined in the same way as dividend payer. Inst holdings are institutional holdings from Thomson Reuters. Short interest is scaled by shares outstanding. SP500 firms is the average number of firms listed in the S&P 500 in each portfolio. Turnover is the monthly trading volume divided by shares outstanding. Panel B report the time-series average of correlations and returns of the monthly portfolios. We use the II index to classify the whole time span into increasing sentiment periods (decreasing sentiment periods) if the sentiment level is higher (lower) than previous month.

<table>
<thead>
<tr>
<th></th>
<th>1 (low)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10 (high)</th>
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<tbody>
<tr>
<td>( \rho )</td>
<td>-0.04</td>
<td>0.07</td>
<td>0.12</td>
<td>0.16</td>
<td>0.19</td>
<td>0.23</td>
<td>0.26</td>
<td>0.30</td>
<td>0.34</td>
<td>0.42</td>
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<tr>
<td>ME-Avg</td>
<td>1646</td>
<td>1506</td>
<td>1777</td>
<td>1734</td>
<td>1586</td>
<td>2008</td>
<td>1740</td>
<td>1987</td>
<td>2051</td>
<td>2240</td>
</tr>
<tr>
<td>ME-Median</td>
<td>131</td>
<td>135</td>
<td>143</td>
<td>153</td>
<td>162</td>
<td>194</td>
<td>205</td>
<td>226</td>
<td>284</td>
<td>352</td>
</tr>
<tr>
<td>B/M</td>
<td>0.81</td>
<td>0.77</td>
<td>0.84</td>
<td>0.84</td>
<td>0.87</td>
<td>0.86</td>
<td>0.82</td>
<td>0.86</td>
<td>0.87</td>
<td>0.83</td>
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<tr>
<td>R&amp;D</td>
<td>1.96</td>
<td>3.20</td>
<td>4.97</td>
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<td>0.81</td>
<td>0.82</td>
<td>1.16</td>
<td>1.19</td>
<td>0.52</td>
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<td>Operating Profitability</td>
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<td>0.09</td>
<td>0.06</td>
<td>0.14</td>
<td>0.05</td>
<td>0.11</td>
<td>0.10</td>
<td>0.09</td>
<td>0.17</td>
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<td>Investment</td>
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<td>0.14</td>
<td>0.13</td>
<td>0.13</td>
<td>0.14</td>
<td>0.12</td>
<td>0.15</td>
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<tr>
<td>Age</td>
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<td>17.10</td>
<td>17.43</td>
<td>17.80</td>
<td>17.85</td>
<td>18.35</td>
<td>18.38</td>
<td>18.66</td>
<td>19.05</td>
<td>19.51</td>
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<td>Div payers (%)</td>
<td>47.36</td>
<td>48.62</td>
<td>50.46</td>
<td>51.36</td>
<td>51.95</td>
<td>52.63</td>
<td>54.09</td>
<td>55.42</td>
<td>55.04</td>
<td>57.23</td>
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<tr>
<td>Repurchase (%)</td>
<td>1.84</td>
<td>1.89</td>
<td>1.82</td>
<td>1.61</td>
<td>1.64</td>
<td>1.69</td>
<td>1.55</td>
<td>1.67</td>
<td>1.78</td>
<td>1.59</td>
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<tr>
<td>Repurchasers (%)</td>
<td>55.11</td>
<td>56.28</td>
<td>57.12</td>
<td>57.64</td>
<td>57.74</td>
<td>57.44</td>
<td>57.58</td>
<td>58.21</td>
<td>58.54</td>
<td>58.39</td>
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<tr>
<td>Inst holdings (%)</td>
<td>31.02</td>
<td>34.25</td>
<td>35.48</td>
<td>36.80</td>
<td>37.15</td>
<td>38.10</td>
<td>39.00</td>
<td>39.80</td>
<td>40.66</td>
<td>41.87</td>
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<tr>
<td>Short interests (%)</td>
<td>2.01</td>
<td>2.04</td>
<td>1.94</td>
<td>1.89</td>
<td>1.91</td>
<td>1.84</td>
<td>1.87</td>
<td>1.82</td>
<td>1.87</td>
<td>1.91</td>
</tr>
<tr>
<td>SP500 firms (%)</td>
<td>31.02</td>
<td>32.34</td>
<td>36.59</td>
<td>37.55</td>
<td>38.34</td>
<td>41.52</td>
<td>43.64</td>
<td>44.55</td>
<td>46.66</td>
<td>51.55</td>
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<tr>
<td>Turnover (%)</td>
<td>8.52</td>
<td>8.96</td>
<td>8.91</td>
<td>8.68</td>
<td>8.62</td>
<td>8.70</td>
<td>8.84</td>
<td>8.88</td>
<td>8.93</td>
<td>9.59</td>
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Panel B: excess returns on portfolios formed on correlations with market sentiment

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<th>Return</th>
<th>Std. Dev</th>
<th>Return (increasing)</th>
<th>Return (decreasing)</th>
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<td>Return</td>
<td>0.93</td>
<td>0.99</td>
<td>0.98</td>
<td>0.88</td>
</tr>
<tr>
<td>Std. Dev</td>
<td>5.43</td>
<td>5.56</td>
<td>5.59</td>
<td>5.61</td>
</tr>
<tr>
<td>Return (increasing)</td>
<td>3.09</td>
<td>3.21</td>
<td>3.30</td>
<td>3.21</td>
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<td>Return (decreasing)</td>
<td>-1.19</td>
<td>-1.19</td>
<td>-1.30</td>
<td>-1.41</td>
</tr>
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Table VII
Summary of Risk Factor-mimicking Portfolios in All Periods, Increasing Sentiment Periods, and Decreasing Sentiment Periods
Panel A reports the monthly excess returns on risk factor-mimicking portfolios for the whole period from July 1971 to December 2014. Column (4) – (8) report the cross correlations between factors. Panels B and C report the summary of risk factor-mimicking portfolios in increasing and decreasing sentiment periods, respectively. p-values are in the parentheses. *, **, and *** indicate significance at 5%, 1%, and 0.1% level, respectively.

<table>
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<th>Factor</th>
<th>Monthly return</th>
<th>Std dev</th>
<th>Cross correlations</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>MRP</td>
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<td>Panel A: summary of risk factor-mimicking portfolios (all periods)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>MRP</td>
<td>0.53</td>
<td>4.57</td>
<td>1.00</td>
</tr>
<tr>
<td>SMB</td>
<td>0.21</td>
<td>3.06</td>
<td>0.25*** 1.00</td>
</tr>
<tr>
<td>HML</td>
<td>0.37</td>
<td>2.98</td>
<td>−0.31*** −0.11** 1.00</td>
</tr>
<tr>
<td>MOM</td>
<td>0.70</td>
<td>4.40</td>
<td>−0.14** −0.03 −0.16*** 1.00</td>
</tr>
<tr>
<td>RMW</td>
<td>0.29</td>
<td>2.23</td>
<td>−0.23*** −0.39*** 0.15*** 0.08 1.00</td>
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<tr>
<td>CMA</td>
<td>0.35</td>
<td>1.98</td>
<td>−0.39*** −0.05 0.70*** 0.03 −0.02 1.00</td>
</tr>
<tr>
<td>SENT</td>
<td>−0.03</td>
<td>2.06</td>
<td>0.39*** 0.09* −0.24*** −0.28*** −0.27*** −0.27*** 1.00</td>
</tr>
<tr>
<td>Panel B: summary of risk factor-mimicking portfolios (increasing sentiment periods)</td>
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<td></td>
<td></td>
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<tr>
<td>MRP</td>
<td>2.66</td>
<td>3.72</td>
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<tr>
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<td>3.19</td>
<td>0.10 1.00</td>
</tr>
<tr>
<td>HML</td>
<td>−0.02</td>
<td>3.11</td>
<td>−0.33*** −0.16* 1.00</td>
</tr>
<tr>
<td>MOM</td>
<td>0.19</td>
<td>5.02</td>
<td>−0.20** −0.08 −0.25*** 1.00</td>
</tr>
<tr>
<td>RMW</td>
<td>0.03</td>
<td>2.45</td>
<td>−0.16* −0.48*** 0.18** 0.05 1.00</td>
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<tr>
<td>CMA</td>
<td>0.06</td>
<td>1.99</td>
<td>−0.40*** −0.05 0.68*** −0.03 −0.09 1.00</td>
</tr>
<tr>
<td>SENT</td>
<td>0.32</td>
<td>2.31</td>
<td>0.35*** 0.15* −0.22*** −0.31*** −0.28*** −0.24*** 1.00</td>
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<tr>
<td>Panel C: summary of risk factor-mimicking portfolios (decreasing sentiment periods)</td>
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<td></td>
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<tr>
<td>MRP</td>
<td>−1.56</td>
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<td>SMB</td>
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<td>2.85</td>
<td>0.30*** 1.00</td>
</tr>
<tr>
<td>HML</td>
<td>0.76</td>
<td>2.81</td>
<td>−0.25*** −0.02 1.00</td>
</tr>
<tr>
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<td>1.19</td>
<td>3.63</td>
<td>0.01 0.10 −0.07 1.00</td>
</tr>
<tr>
<td>RMW</td>
<td>0.53</td>
<td>1.97</td>
<td>−0.25*** −0.25*** 0.09 0.11 1.00</td>
</tr>
<tr>
<td>CMA</td>
<td>0.64</td>
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<td>0.34*** 0.00 0.71*** 0.08 0.04 1.00</td>
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<tr>
<td>SENT</td>
<td>−0.36</td>
<td>1.73</td>
<td>0.39*** −0.05 −0.23*** −0.18** −0.22*** −0.26*** 1.00</td>
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Regressions for Equal-weighted Correlation Portfolios: July 1971 to December 2014

This table reports the regression results of portfolio monthly excess returns on the market sentiment factor and other risk factors. At the end of June of year $t$, stocks are allocated into 10 equal-weighted portfolios on the basis of their correlations between their return and market sentiment. Stock returns are collected from CRSP from 1967 to 2014. The correlation, $\rho$, is calculated using 48 monthly returns ending in June of year $t$. We further divide the top and bottom portfolios into thirds to investigate the properties of extreme portfolios; A (C) denotes low (high) correlation with sentiment. We sort all firms on their correlations into three portfolios, using 30% and 70% breakpoints, and define market sentiment factor (SENT) as the difference of portfolio excess returns between the top and bottom portfolios. The risk factors, MRP, SMB, HML, RMW, CMA and MOM are collected from Kenneth R. French’s data library on monthly basis. *, **, and *** indicate significance at 5%, 1%, and 0.1% level, respectively. We estimate the following factor model: $R_{p,t} - R_{f,t} = \alpha_p + \beta_{1,p}MRP_t + \beta_{2,p}SMB_t + \beta_{3,p}HML_t + \beta_{4,p}RMW_t + \beta_{5,p}CMA_t + \beta_{6,p}MOM_t + \beta_{7,p}SENT_t + \epsilon_{p,t}$.

<table>
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<tr>
<th>Portfolio</th>
<th>Alpha</th>
<th>MRP</th>
<th>SMB</th>
<th>HML</th>
<th>RMW</th>
<th>CMA</th>
<th>MOM</th>
<th>SENT</th>
<th>Adj R²</th>
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<tr>
<td>1A</td>
<td>0.24*</td>
<td>0.93***</td>
<td>0.74***</td>
<td>0.20***</td>
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<td>-0.09</td>
<td>-0.18***</td>
<td>-1.02***</td>
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<td></td>
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<td>(23.02)</td>
<td>(4.52)</td>
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<td>(-1.34)</td>
<td>(-8.32)</td>
<td>(-20.46)</td>
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</tr>
<tr>
<td>1B</td>
<td>0.38***</td>
<td>0.96***</td>
<td>0.75***</td>
<td>0.19***</td>
<td>-0.01</td>
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<tr>
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<td>0.99***</td>
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<td>0.78***</td>
<td>0.23***</td>
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<td>-0.21***</td>
<td>-0.98***</td>
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<tr>
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<td>(53.57)</td>
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<td>(6.63)</td>
<td>(-1.33)</td>
<td>(-1.09)</td>
<td>(-12.02)</td>
<td>(-25.22)</td>
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<td>0.99***</td>
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<td>0.20***</td>
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<td>0.03</td>
<td>-0.18***</td>
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<td>0.06</td>
<td>-0.18***</td>
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<td>(1.29)</td>
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<td>-0.17***</td>
<td>-0.28***</td>
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<td>0.15***</td>
<td>-0.10**</td>
<td>0.06</td>
<td>-0.17***</td>
<td>-0.19***</td>
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<td>6</td>
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<td>0.78***</td>
<td>0.13***</td>
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<td>-0.19***</td>
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<td>0.934</td>
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<td>(58.33)</td>
<td>(33.28)</td>
<td>(4.02)</td>
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<tr>
<td>7</td>
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<td>0.96***</td>
<td>0.79***</td>
<td>0.13***</td>
<td>-0.12***</td>
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<td>(61.18)</td>
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<tr>
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<td>0.99***</td>
<td>0.80***</td>
<td>0.21***</td>
<td>-0.06</td>
<td>-0.08</td>
<td>-0.20***</td>
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<td>(10.52)</td>
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<td>0.78***</td>
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<td>(8.32)</td>
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<tr>
<td>10B</td>
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<td>1.00***</td>
<td>0.79***</td>
<td>0.17***</td>
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<td>(29.00)</td>
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<td>(-10.81)</td>
<td>(6.92)</td>
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<td>0.84***</td>
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<td>-0.19**</td>
<td>-0.24***</td>
<td>0.49***</td>
<td>0.910</td>
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<td>(4.52)</td>
<td>(43.89)</td>
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<td>(0.02)</td>
<td>(-2.84)</td>
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<td>(9.72)</td>
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<tr>
<td>10–1</td>
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<td>0.03**</td>
<td>0.03</td>
<td>-0.02</td>
<td>-0.01</td>
<td>-0.02</td>
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<td>(2.80)</td>
<td>(1.71)</td>
<td>(-0.89)</td>
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<td>(-0.60)</td>
<td>(0.26)</td>
<td>(52.32)</td>
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<tr>
<td>10C–1A</td>
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<td>0.08**</td>
<td>0.10**</td>
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<td>-0.10</td>
<td>-0.06*</td>
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<td></td>
<td>(1.81)</td>
<td>(3.23)</td>
<td>(2.75)</td>
<td>(1.67)</td>
<td>(1.62)</td>
<td>(-1.38)</td>
<td>(-2.46)</td>
<td>(27.67)</td>
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Table IX
SENT Loadings in Fama-French Three-, Four, and Five-Factor Models
This table reports the SENT loadings in sentiment-augmented three-, four-, and five-factor models. The three-factor model contains MRP, SMB and HML. The five-factor model contains RMW (robust minus weak profitability) and CMA (low minus high investment) in addition to the Fama-French three factors. We omit HML in the sentiment-augmented four-factor model. At the end of June of year \( t \), stocks are allocated into ten equal-weighted portfolios on the basis of their correlations between their return and market sentiment. Monthly stock returns are collected from CRSP from 1967 to 2014. The correlation, \( \rho \), is calculated using 48 monthly returns ending in June of year \( t \). We sort all firms on their correlations into three portfolios, using 30% and 70% breakpoints, and define the market sentiment factor (SENT) as the difference of portfolio excess returns between the top and bottom portfolios. MRP, SMB, HML, MOM, RMW, and CMA are collected from Kenneth R. French’s data library on monthly basis. *, **, and *** indicate significance at 5%, 1%, and 0.1% level, respectively.

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Three-Factor</th>
<th>Four-Factor</th>
<th>Five-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(low)</td>
<td>-0.84***</td>
<td>-0.86***</td>
<td>-0.87***</td>
</tr>
<tr>
<td>2</td>
<td>-0.53***</td>
<td>-0.54***</td>
<td>-0.55***</td>
</tr>
<tr>
<td>3</td>
<td>-0.35***</td>
<td>-0.37***</td>
<td>-0.37***</td>
</tr>
<tr>
<td>4</td>
<td>-0.17***</td>
<td>-0.18***</td>
<td>-0.19***</td>
</tr>
<tr>
<td>5</td>
<td>-0.07</td>
<td>-0.09*</td>
<td>-0.10*</td>
</tr>
<tr>
<td>6</td>
<td>-0.01</td>
<td>-0.02</td>
<td>-0.03</td>
</tr>
<tr>
<td>7</td>
<td>0.21***</td>
<td>0.18***</td>
<td>0.17***</td>
</tr>
<tr>
<td>8</td>
<td>0.34***</td>
<td>0.33***</td>
<td>0.32***</td>
</tr>
<tr>
<td>9</td>
<td>0.41***</td>
<td>0.40***</td>
<td>0.39***</td>
</tr>
<tr>
<td>10 (high)</td>
<td>0.53***</td>
<td>0.51***</td>
<td>0.50***</td>
</tr>
<tr>
<td>10−1</td>
<td>1.37***</td>
<td>1.37***</td>
<td>1.37***</td>
</tr>
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</table>
This table reports the SENT loadings in the sentiment-augmented model for portfolios sorted on size, book-to-market ratio, operating profitability, investment, and institutional holdings. At the end of June of year $t$, we sort all firms in our sample based on their correlations between return and market sentiment into three portfolios, using 30% and 70% breakpoints, and define the market sentiment factor (SENT) as the difference of portfolio excess returns between the top and bottom portfolios. The correlation, $\rho$, is calculated using 48 monthly returns ending in June of year $t$. We obtain these portfolios directly from Kenneth R. French’s data library except for the institutional-ownership portfolios that are formed using our sample. The risk factors, MRP, SMB, HML, RMW, CMA, and MOM are also from Kenneth R. French’s data library. *, **, and *** indicate significance at 5%, 1%, and 0.1% level, respectively. We estimate the following factor model: $R_{p,t} - R_{f,t} = \alpha_p + \beta_{1,t}MRP_t + \beta_{2,t}SMB_t + \beta_{3,t}HML_t + \beta_{4,t}RMW_t + \beta_{5,t}CMA_t + \beta_{6,t}MOM_t + \beta_{7,t}SENT_t + \varepsilon_{p,t}$.

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Size</th>
<th>Book-to-Market</th>
<th>Operating Profitability</th>
<th>Investment</th>
<th>Institutional Holdings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (low)</td>
<td>-0.34***</td>
<td>-0.19***</td>
<td>-0.39***</td>
<td>-0.42***</td>
<td>-0.38***</td>
</tr>
<tr>
<td>2</td>
<td>0.00</td>
<td>-0.14***</td>
<td>-0.19***</td>
<td>-0.15***</td>
<td>-0.27***</td>
</tr>
<tr>
<td>3</td>
<td>0.01</td>
<td>-0.13***</td>
<td>-0.13***</td>
<td>-0.13***</td>
<td>-0.32***</td>
</tr>
<tr>
<td>4</td>
<td>0.11***</td>
<td>-0.16***</td>
<td>-0.06*</td>
<td>-0.05</td>
<td>-0.21***</td>
</tr>
<tr>
<td>5</td>
<td>0.12***</td>
<td>-0.19***</td>
<td>-0.09***</td>
<td>-0.06*</td>
<td>-0.14***</td>
</tr>
<tr>
<td>6</td>
<td>0.10**</td>
<td>-0.05</td>
<td>-0.08***</td>
<td>-0.08**</td>
<td>-0.10**</td>
</tr>
<tr>
<td>7</td>
<td>0.11***</td>
<td>-0.16***</td>
<td>-0.12***</td>
<td>-0.07*</td>
<td>-0.07*</td>
</tr>
<tr>
<td>8</td>
<td>0.09**</td>
<td>-0.11***</td>
<td>-0.10***</td>
<td>-0.12***</td>
<td>-0.03</td>
</tr>
<tr>
<td>9</td>
<td>0.06*</td>
<td>-0.14***</td>
<td>-0.06*</td>
<td>-0.11***</td>
<td>0.04</td>
</tr>
<tr>
<td>10 (high)</td>
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<td>-0.18***</td>
<td>-0.16**</td>
<td>0.09*</td>
</tr>
<tr>
<td>10–1</td>
<td>0.36***</td>
<td>-0.12*</td>
<td>0.21**</td>
<td>0.26***</td>
<td>0.47***</td>
</tr>
</tbody>
</table>
FIGURE I
Magnitudes of risk factors
This figure shows average monthly premiums of SENT factor in comparison with average monthly premiums on traditional asset pricing factors: MRP, SMB and HML.