

## **Analysts' preference for growth investing and vulnerability to market-wide sentiment**

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## **Abstract**

Existing studies have argued that market-wide sentiment primarily affects individual noise traders, rather than other sophisticated market participants. Contrary to this perspective, in this study, we find that financial analysts, who are sophisticated market participants, may be more vulnerable to sentiment than their peers. As a reason for this vulnerability, we focus on analysts' preference for growth investing, and predict that, due to this preference, their fair value estimations for growth stocks would be more upwardly biased by bullish market-wide sentiment than those of their market peers. We also predict that this biased estimation for growth stocks would lower the investment value of their recommendations. As is consistent with our predictions, we find that, especially during periods of bullish sentiment, analysts consider growth stocks to be undervalued, even though these stocks are in fact overvalued. In addition, we find that recommended stocks experience poor relative return performance, especially after periods of bullish sentiment, and that this poor performance is not observed after controlling for growth factors.

Keywords: investor sentiment; financial analyst; stock recommendation; growth investing

JEL classification: G2, G14, G17, G23

## 1. Introduction

Several behavioral finance studies have argued that correlated investor sentiment drives stock prices away from their fundamental values (De Long et al. 1990; Shleifer and Vishny 1997). As is consistent with this argument, studies have shown that time-varying market-wide sentiment affects cross-sectional stock returns. Lemmon and Portniaguina (2006) and Baker and Wurgler (2006, 2007) have used a measure of market-wide investor sentiment to show that difficult-to-value stocks (i.e., small, young, volatile stocks) are overvalued, especially when investor sentiment is high. Antoniou et al. (2013) show that investor sentiment is positively associated with the profitability of price momentum strategies. Meanwhile, Stambaugh et al. (2012) conclude that anomalies are stronger and entail higher potential profits in periods following high sentiment. Such effects of sentiment are usually attributed to individual noise traders, since market-wide sentiment is considered to primarily affect these traders (De Long et al. 1990; Shleifer and Summers 1990; Lee et al. 1991).

On the other hand, Brown and Cliff (2004) cast doubt on the view that market-wide sentiment primarily affects individual noise traders. They argue that the sentiment effect not only influences individual noise traders, but professional investors as well. In line with their argument, several studies have shown the effects of sentiment on professional financial analysts, who are typically regarded as sophisticated market participants. Bagnoli et al. (2009) have reported that some analysts are sensitive to market-wide sentiment, and that the recommendations of these analysts are less profitable than those of their peers. Walther and Willis (2013) show that bullish market-wide investor sentiment induces optimistic earnings forecasts. Hribar and McNnis (2012) find that investor sentiment affects the earnings expectations for firms that are difficult to evaluate. In sum, these studies show that analysts are influenced by market-wide sentiment. However, they only demonstrate that financial analysts are, at some level, influenced by market-wide sentiment, which significantly influences individual noise traders. As such, they neither support nor go against the conventional wisdom that market-wide sentiment primarily affects individual noise traders rather than other more sophisticated market participants.<sup>2</sup>

In this study, we provide counter-evidence to this conventional wisdom, i.e. we show that financial analysts, who are regarded as sophisticated market participants, may be more vulnerable to sentiment than their market peers.

As a reason for analysts' vulnerability to sentiment, we focus on their excessive preference for

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<sup>2</sup> Forecast optimism does not reflect the difference between analysts' estimates and market consensus, but the difference between analysts' estimates and actual earnings. Thus, the effect of sentiment on earnings forecast optimism does not indicate whether financial analysts are more influenced by sentiment than other market participants.

growth investing which is not aligned with investment value of their stock recommendations. Jegadeesh et al. (2004) have shown that analysts tend to focus excessively on growth investment, due to the economic incentives involved, such as promoting a firm's investment banking business (Lin and McNichols, 1998; Michaely and Womack, 1999; Ljungqvist et al., 2006; Barber et al., 2007; Kolasinski and Kothari, 2008), and boosting brokerage trading revenue (Jackson, 2005; Irvine et al., 2007). This behavior results in favorable recommendations for growth stocks (i.e., positive momentum, high trading volume, high growth, and overvalued stocks). Jegadeesh et al. (2004) show that this behavior is not aligned with the investment value of stock recommendations, except when analysts prefer momentum stocks.

The valuation of a firm's growth component is highly sensitive to investor beliefs about discount rates. Excessively low estimated discount rates lead investors to overvalue a firm's growth components. In addition, investor sentiment may reflect investor beliefs about discount rates that are not supported by prevailing economic and financial fundamentals (Lemmon and Portniaguina 2006; Baker and Wurgler 2006). Given that analysts' discount rate estimations commove with those of investors, analysts' preferences for growth investing could make their fair value estimates more sensitive to sentiment. More specifically, due to these preferences, analysts' fair value estimates for growth stocks may be more upwardly biased by bullish market-wide sentiment than those of other market participants. As such, analysts tend to consider growth stocks to be undervalued, especially during periods of bullish market-wide sentiment, even if growth stocks are actually overvalued during those periods. In addition, we argue that this behavior is not at all aligned with the investment performance of stock recommendations, meaning that analysts' biased evaluations during periods of bullish sentiment could negatively impact the investment performance of recommended stocks. Thus, recommended stocks could experience low stock returns, especially after periods of bullish sentiment, due to excessive optimism about growth stocks during those periods.

In this study, we engage in empirical analyses that test these possibilities. We use the Baker and Wurgler (BW) market-wide investor sentiment index and the Michigan consumer sentiment index to explore market-wide sentiment effects.

Our findings support our predictions. First, we find that growth stocks are more overvalued during periods of higher sentiment. Second, we find that analysts consider growth stocks to be more undervalued when investor sentiment is higher. These findings support the argument that fair value estimation is more upwardly biased by bullish investor sentiment than by the input of other market participants. Finally, we find that recommended stocks experience lower stock returns following periods of higher investor sentiment. This poor relative return performance of recommended stocks

after periods of bullish sentiment can be observed even after controlling for difficult-to-value factors. However, this poor performance is not observed when we control for growth factors. These findings indicate that the poor return performance of recommended stocks during periods of bullish sentiment is induced by the poor performance of growth stocks during such periods. In other words, our findings support the inference that analysts' biased views on growth stocks during periods of bullish sentiment lower the performance of recommended stocks.

The rest of this paper proceeds as follows. Section 2 presents the development of our hypotheses. Section 3 describes our sample and our definitions of growth indicators. Section 4 offers an analysis of the association between sentiment and the valuation of growth stocks. Section 5 analyses the effect of sentiment on analysts' views on growth stocks. Section 6 explores whether analysts' optimism about growth stocks during periods of bullish sentiment lowers the relative performance of recommended stocks. Section 7 assesses whether analysts' vulnerability to sentiment is induced by their irrational discount rate estimations or earnings forecast errors. Finally, our findings are summarized in Section 8.

## **2. Hypothesis development**

We begin our study by examining whether analysts' preference for growth investing results in their excessive sensitivity to market-wide sentiment. Evaluations of a firm's growth components are highly sensitive to discount rate estimations. In addition, market-wide sentiment reflects consensus about discount rates. Analysts' discount rate estimates commove consensus estimates. As such, their fair value estimates, which are more influenced by firms' growth components than those of other market participants, may be particularly prone to sentiment. More specifically, analysts' fair value estimates for growth firms may be more upwardly biased by bullish sentiment than those of other market participants. In other words, analysts could consider growth stocks to be undervalued during periods of bullish sentiment, even though those stocks are likely to be overvalued during such periods. To test whether this is the case, we decompose our prediction into two parts. The first is that growth stocks will be more overvalued during periods of higher sentiment. The second is that analysts consider the growth stocks involved to be attractive (undervalued) during those periods.

Overvalued stocks are highly likely to underperform in periods subsequent to those of higher sentiment. Thus, our first prediction can be described by the following hypothesis:

Hypothesis 1: The relative return performance of growth stocks is lower when beginning-of-period investor sentiment is higher.

Analysts' favorable (buy) recommendations for a stock indicate that they consider the stock to be undervalued. Thus, our second prediction can be described with the following hypothesis:

Hypothesis 2: Growth stocks receive more favorable stock recommendations during periods of higher investor sentiment.

If both hypothesis 1 and 2 are supported, this indicates that analysts' fair value estimates for growth stocks are more upwardly biased by bullish market-wide sentiment than those of other market participants. This biased estimation could have a negative impact on the performance of recommended stocks. In particular, analysts' excessive optimism about growth stocks during periods of bullish sentiment could result in the poor relative performance of their recommended stocks during such periods.<sup>3</sup> To test this prediction, we divide it into two parts. The first is that recommended stocks experience lower subsequent stock returns after periods of higher sentiment, while the second is that their poor relative performance during periods of bullish sentiment can be attributed to the excessive optimism about growth stocks during such periods. Our hypothesis regarding the above-mentioned first prediction is as follows:

Hypothesis 3: Stocks with favorable recommendations experience lower returns following a period of higher investor sentiment.

If analysts' aggressive views on growth stocks during periods of bullish sentiment account for their poor performance after such periods, the poor performance should not be observed after controlling for growth factors. Thus, our hypothesis regarding the above-mentioned second prediction can be described as follows:

Hypothesis 4: There is no significant negative association between beginning-of-period investor sentiment and the relative return performance of recommended stocks after controlling for growth factors.

### **3. Data and definitions**

#### **3.1 Growth Characteristics**

In this study, we consider two direct growth indicators (i.e., past sales growth and analysts' long-term growth forecasts) and three indirect growth measures (i.e., turnover ratio, book-to-price,

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<sup>3</sup> During periods of bearish sentiment, excessively low discount rates for future cash flows make it less likely that analysts' preference for growth investing will result in excessive optimism for growth stocks. Thus, we predict that the negative impact of analysts' preference for growth investing on the investment value of their recommendations will be limited during such periods.

and earnings-to-price). Jegadeesh et al. (2004) show that analysts' preference for growth investing based on these indicators is not aligned with the investment value of their stock recommendations. Further details on the growth indicators used in our study are as follows:

Direct growth indicators: We include growth rates in sales per share<sup>4</sup> over one year (we denote the sales growth rates for stock  $i$  at the end of month  $t$  as  $SG_{i,t}$ ). In addition, we include  $LTG_{i,t}$ , which represents the mean long-term earnings growth forecast for firm  $i$  at the end of month  $t$ . Stocks with high  $SG_{i,t}$ , or  $LTG_{i,t}$  are regarded as growth stocks. Both stocks with higher past sales growth and higher long-term growth forecasts have been found to earn lower subsequent returns (Lakonishok et al., 1994; La Porta, 1996).

Indirect growth indicators: We first consider  $TURN_{i,t}$ , which is the average daily volume turnover for a stock in the preceding six months. Since high turnover stocks have growth properties (Lee and Swaminathan 2000)<sup>5</sup>, we regard these stocks as growth stocks. Lee and Swaminathan (2000) find that stocks experiencing high turnover earn lower returns in subsequent months. In addition, we consider two variables concerning valuation: earnings-to-price ratio ( $EP_{i,t}$ )<sup>6</sup> and book-to-price ratio ( $BP_{i,t}$ ).<sup>7</sup> We regard stocks with low  $EP_{i,t}$  or  $BP_{i,t}$  as growth stocks. Basu (1977) have shown that low EP firms underperform high EP firms. In addition, Fama and French (1992) have shown that low BP stocks underperform high BP stocks.

### 3.2 Sample

We obtain our sample of analysts' recommendations from the unadjusted Institutional Brokers Estimate System (IBES) summary file. We collect data on all common stocks and excluded the shares of non-US firms. We also exclude stocks that had not received more than three analysts' recommendations and those priced below \$5 (penny stocks), to ensure that our empirical findings are not driven by low-coverage stocks and low-priced stocks.<sup>8</sup> We utilize monthly data from the end of 1993 until the end of 2010. On average, there are approximately 2,000 firms in our sample for each month.

As mentioned earlier, for the main part of our analysis, we measure investor sentiment by using the monthly time series of the BW investor sentiment index and the Michigan consumer sentiment

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<sup>4</sup> Sales are defined as the rolling sum of sales for the preceding four quarters.

<sup>5</sup> They show that stocks with high  $TURN_{i,t}$  tend to receive high long-term growth forecasts.

<sup>6</sup> EP is defined as the rolling sum of EPS for the preceding four quarters, deflated by price.

<sup>7</sup> BP is defined as the book value of total common equity at the end of the most recent quarter, deflated by price.

<sup>8</sup> We note, however, that our empirical results do not appear to vary based on the exclusion of low-coverage stocks and penny stocks.

index,<sup>9</sup> since these indices are commonly used in extant investor-sentiment studies. To ensure that both indices were free of macroeconomic influences, following the approach taken by Baker and Wurgler, we conduct our investigation by using an orthogonal version of the indices, which is obtained by regressing the indices against a set of macroeconomic variables.<sup>10</sup> Figure 1 plots the two series. The two sentiment indices rise during the late 1990s and fall during the early 2000s. These patterns are in line with the evidence for investor sentiment discussed by Baker and Wurgler.

[Figure 1]

#### 4. Relative returns of growth stocks

In this section, we test hypothesis 1, which posits that growth stocks experience lower stock returns when beginning-of-period sentiment is higher.

##### 4.1 Methodology

We first examine the association between beginning-of-period market-wide investor sentiment and the return performance of growth stocks (stocks with high *SG*, *LTG*, and *TURN* and with low *BP* and *EP*) relative to that for non-growth stocks.

We find that unadjusted raw growth indicators tend to contain large outliers. For example, the growth indicators for firms that grow from low positive values of base-year net income typically include large outliers. To reduce the influence of these outliers on our results, following the approach taken by Hess et al. (2013), we calculate the decile ranks of firms' growth characteristics for each month's end. The decile ranks of  $SG_{i,t}$ ,  $LTG_{i,t}$ ,  $TURN_{i,t}$ ,  $EP_{i,t}$ , and  $BP_{i,t}$  are denoted as  $dSG_{i,t}$ ,  $dLTG_{i,t}$ ,  $dTURN_{i,t}$ ,  $dEP_{i,t}$ , and  $dB P_{i,t}$ , respectively. We code decile ranks so that stocks with more growth characteristics receive higher scores. The bottom 10% of observations within direct growth indicators and the trading volume indicator (*SG*, *LTG*, and *TURN*) are assigned a rank of "1," while the top 10% are given a rank of "10." On the other hand, since stocks with low *BP* and *EP* are regarded as growth stocks, we give stocks with lower *EP* and *BP* higher scores. In those cases, the top 10% receives a rank of "1," while the bottom 10% group receives a rank of "10."

Then, following a study by Honcoop and Lehnert (2007), we perform the following two-step

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<sup>9</sup> Practitioners often employ the VIX index as an investor sentiment index. However, Whaley (2000) observes that the VIX index is an indicator of investors' fear of downsides, and cannot capture investor optimism during a market boom. Our studies examine whether analysts' fair value estimates are more distorted by bullish market-wide sentiment (market-wide optimism) than by other situations. Thus, we do not use the VIX index as an investor sentiment index in our study, as it cannot capture market-wide optimism.

<sup>10</sup> Please refer to Baker and Wurgler (2006, 2007) for more details on the methodology for obtaining macroeconomic free indices.



regression analysis.

(1) For the end of each month, we regress subsequent one-month returns (stock returns for the following month) on one of the decile ranks of the growth characteristics ( $dSG_{i,t}$ ,  $dLTG_{i,t}$ ,  $dTURN_{i,t}$ ,  $dBPI_{i,t}$ , or  $dEP_{i,t}$ ) as follows:

$$R_{i,t+1} = \alpha_{A,s,t} + \beta_{A,s,t} \text{Indicator}_{i,s,t} + \varepsilon_{Ai,s,t} \quad (1)$$

$R_{i,t+1}$  denotes one-month returns for stock  $i$  over the month  $t+1$ .  $\text{Indicator}_{i,s,t}$  ( $s=1,2,\dots,5$ ) denotes  $dSG_{i,t}$ ,  $dLTG_{i,t}$ ,  $dTURN_{i,t}$ ,  $dBPI_{i,t}$ , and  $dEP_{i,t}$ , respectively.  $\beta_{A,s,t}$  can be regarded as a proxy for the relative return performance of growth stocks.

(2) We examine whether the time-varying regression coefficient  $\beta_{A,s,t}$  is associated with the proxies of market-wide investor sentiment by running the following regression:

$$\beta_{A,s,t} = c_{Ak,s} + d_{Ak,s} \text{SENTIMENT}_{k,t} + e_{Ak,s,t} \quad (2)$$

$\text{SENTIMENT}_{k,t}$  ( $k=1, 2$ ) denote the BW sentiment index and the Michigan consumer sentiment index, respectively. The coefficient  $d_{Ak,s}$  is estimated with the WLS method, where the reciprocal of the square of the standard error of the coefficient  $\beta_{A,s,t}$  in the regression model (1) is used as a weight. A negative coefficient in equation (2) ( $d_A < 0$ ) indicates that growth stocks experience lower stock returns following periods of higher investor sentiment.<sup>11</sup>

## 4.2 Results

The regression results are shown in Table 1. The results indicate the possibility that growth stocks experience lower stock returns when the beginning-of-period sentiment index is higher. The coefficient  $\beta_{A,s,t}$  is significantly negatively associated with the BW index and the Michigan index, regardless of which growth characteristic is used. These results strongly support Hypothesis 1, which posits that the relative return performance of growth stocks is negatively associated with investor sentiment. In other words, our findings support the inference that growth stocks are more overvalued when sentiment is higher.

[Table 1]

## 5. Aggressive views on growth stocks

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<sup>11</sup> We also analyze whether the return spread between the top and bottom growth characteristic quintiles is negatively associated with the beginning-of-period investor sentiment index. Our results (available upon request) reveal that the return spread is negatively associated with that index, supporting the view that the relative returns of growth stocks are negatively associated with beginning-of-period market-wide investor sentiment.

## 5.1. Evaluation of analysts' preferences

To test whether growth stocks receive more favorable recommendations during periods of higher sentiment, we first evaluate the cross-sectional relationships between stock recommendations and stocks' growth characteristics at the end of each month. We then analyze whether these time-varying relationships are associated with a monthly investor sentiment index.<sup>12</sup>

More specifically, following the studies of Jegadeesh et al. (2004) and Hess et al. (2013), we evaluate analysts' bullish views on growth stocks, in terms of how much they consider growth stocks to be undervalued, based on the Spearman rank correlation coefficient between consensus (mean) stock recommendations<sup>13</sup> and stocks' growth characteristics at the end of each month. Since stocks with high *SG*, *LTG*, or *TURN* are regarded as growth stocks, a high correlation coefficient between consensus recommendations and these growth characteristics (*SG*, *LTG*, and *TURN*) implies that analysts have aggressive views on these growth stocks. In addition, since stocks with low *EP* or low *BP* are regarded as growth stocks, a low (negative) correlation coefficient between consensus recommendations and these valuation characteristics (*EP* and *BP*) also implies analysts' aggressive views on these growth stocks. To make this easier to understand, we calculate and report the correlation coefficients between ranked stock recommendations and inversed-ranked *EP* or *BP*, with higher values implying more aggressive views on growth stocks.

In addition, we evaluate analysts' bullish views on growth stocks based on the difference in growth characteristics between favorably recommended stocks and the least favorably recommended stocks. For the end of each month, we divide the stocks into quintiles, ranging from REC5 (recommended stocks) to REC1 (stocks least favorably recommended), on the basis of consensus in recommendations. We also calculate the averages of the growth characteristics' decile ranks for each recommendation quintile. If decile ranks are higher for REC5 than for REC1, it is likely that analysts consider the growth stocks involved to be attractive (undervalued).

After evaluating analysts' aggressive views on growth stocks for the end of each month, we examine the association between market-wide investor sentiment and time-varying analysts' views on growth stocks. We run regressions of the following types:

$$Corr_{s,t} = c_{Ck,s} + d_{Ck,s} SENTIMENT_{k,t} + e_{Ck,s,t} \quad (3)$$

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<sup>12</sup> The effects of sentiment on time-varying preference can be evaluated through time-series cross-sectional (panel) analysis. However, it is of concern that several growth indicators cannot be compared across time. For example, stocks experiencing 10% sales growth could be categorized as low-growth stocks during an economic boom, but as high-growth stocks during an economic bust. Given this, we do not perform panel analysis to examine sentiment's effect on analysts' views on growth stocks.

<sup>13</sup> We code each individual recommendation so that recommended stocks receive higher scores (5=strong buy, 3=hold, 1=strong sell).

$$\begin{aligned}
Spread_{s,t} &\equiv Growth_{s,REC_{s,t}=High,t} - Growth_{s,REC_{s,t}=Low,t} \\
&= c_{Dk,s} + d_{Dk,s} SENTIMENT_{k,t} + e_{Dk,s,t}
\end{aligned} \tag{4}$$

$Corr_{s,t}$  ( $s=1, 2, \dots, 5$ ) denote the Spearman rank correlation coefficients between  $REC_{i,t}$  and the growth characteristics ( $SG_{i,t}$ ,  $LTG_{i,t}$ ,  $TURN_{i,t}$ , inversed rank of  $BP_{i,t}$ , or inversed rank of  $EP_{i,t}$ , respectively).  $Growth_{s,REC_{s,t}=High,t}$  ( $s=1, 2, \dots, 5$ ) denote the average values of  $dSG_{i,t}$ ,  $dLTG_{i,t}$ ,  $dTURN_{i,t}$ ,  $dBP_{i,t}$ , and  $dEP_{i,t}$ , respectively, for the recommended stock group (REC5).  $Growth_{s,REC_{s,t}=Low,t}$  denote the average values of the same, for the stocks least favorably recommended (REC1).  $Spread_{s,t}$  denote the differences in growth characteristics between recommended stocks and the stocks least favorably recommended. The positive coefficients of  $SENTIMENT$  ( $d_C > 0$  and  $d_D > 0$ ) imply that analysts consider growth stocks to be more undervalued during periods of higher sentiment.

## 5.2 Results

The results of our regression are shown in Table 2. They reveal that both  $Corr$  and  $Spread$  (the dependent variables in formulas (3) and (4), respectively) are significantly positive, indicating that analysts, on average, strongly prefer growth stocks. These results are consistent with the findings of Jegadeesh et al. (2004). They also reveal that both  $Corr$  and  $Spread$  are significantly positively associated with the Michigan consumer sentiment index, regardless of the growth indicator used. In addition, both  $Corr$  for  $TURN$ ,  $BP$ , and  $EP$  and  $Spread$  for  $BP$  and  $EP$  are significantly positively associated with the BW index. On the other hand, the results do not in any way support the negative association of  $Corr$  and  $Spread$  with the proxies of investor sentiment, as all of the coefficients are positive. These findings support Hypothesis 2, which posits that growth stocks receive more favorable recommendations during periods of higher investor sentiment.

In the previous section, we demonstrate that growth stocks are more overvalued during periods of higher sentiment. In this section, we show that analysts consider those stocks to be undervalued during such periods. Both of these findings indicate that fair value estimates by analysts are more upwardly biased by bullish market-wide sentiment. Our results indicate that analysts may be more vulnerable to sentiment than other market participants.

[Table 2]

## 6. Relative returns of recommended stocks

The results of the previous sections support the view that analysts' preference for growth investing results in strong optimism about growth stocks during periods of bullish sentiment. With this in mind, we examine whether this optimism lowers the relative return performance of recommended stocks.

### 6.1 Sentiment's effect on the relative returns of recommended stocks

First, we test Hypothesis 3, which posits that recommended stocks experience lower stock returns following a period of higher investor sentiment. To do so, we perform a two-step regression analysis. At the end of each month, we regress subsequent one-month returns on consensus recommendations as follows:

$$R_{i,t+1} = \alpha_{E_t} + \beta_{E_t} REC_{i,t} + \varepsilon_{E_i,t} \quad (5)$$

Here,  $REC_{i,t}$  denotes consensus recommendations for stock  $i$  at the end of month  $t$ . The coefficient  $\beta_{E_t}$  can be regarded as a proxy for the relative performance of recommended stocks.<sup>14</sup> Then, we examine whether the time-varying regression coefficient  $\beta_{E_t}$  is associated with the market-wide investor sentiment index by running the following regression:

$$\beta_{E_t} = c_{E_k} + d_{E_k} SENTIMENT_{k,t} + e_{E_k,t} \quad (6)$$

We estimate the coefficient  $d_{E_k}$  through the WLS method, using the reciprocal of the square of the standard error of the coefficient  $\beta_{E_t}$  in regression model (5) as a weight.

The results, shown in Table 3 in the "Un-adjusted" column, reveal that the coefficient  $\beta_{E_t}$ , which is the dependent variable in formula (6), is not significantly positive and can even be negative. In addition, our results reveal that the coefficient  $\beta_{E_t}$  is significantly negatively associated with the two sentiment indices. These results support Hypothesis 3, which posits that recommended stocks underperform especially when periods of bullish sentiment.

[Table 3]

### 6.2 Mediation by an excessive optimism for growth stocks

In this section, we examine whether the poor relative performance of recommended stocks during periods of bullish sentiment is induced by analysts' optimism for growth stocks during those

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<sup>14</sup> Since analysts rarely issue sell recommendations (Jegadeesh et al., 2004), the contribution of the relative return performance of stocks with sell recommendations to the slope coefficient is quite limited. Thus, we regard the slope coefficient as a strong proxy for the relative return performance of recommended stocks (stocks with buy recommendations).

periods. To this end, we test Hypothesis 4, which posits that there is no significant negative association between investor sentiment and the relative return performance, after controlling for growth factors.

With this in mind, we regress subsequent stock returns on consensus recommendations and growth characteristics (*SG*, *LTG TURN*, *BP*, and *EP*), as follows:

$$R_{i,t+1} = \alpha_{F_t} + \beta_{F0_t} REC_{i,t} + \beta_{F1_t} dSG_{i,t} + \beta_{F2_t} dLTG_{i,t} + \beta_{F3_t} dTURN_{i,t} + \beta_{F4_t} dBP_{i,t} + \beta_{F5_t} dEP_{i,t} + \varepsilon_{F_{i,t}} \quad (7)$$

The coefficient of *REC* ( $\beta_{F0_t}$ ) in model (7) is regarded as a proxy for the relative performance of recommended stocks, after controlling for growth factors. Then, we regress the coefficient on the sentiment index as follows:

$$\beta_{F0_t} = c_{F_k} + d_{F_k} SENTIMENT_{k,t} + e_{F_{k,t}} \quad (8)$$

The coefficient  $d_{F_k}$  is estimated with the WLS method, where the reciprocal of the square of the standard error of the coefficient  $\beta_{F0_t}$  in the regression model (7) is used as a weight.

The regression results, shown in Table 3 in the ‘‘Growth characteristics adjusted’’ column, reveal that the coefficient  $d_{F_k}$  is not significantly negative and can even be positive, indicating that the coefficient of *REC* ( $\beta_{F0_t}$ ) is no longer associated with the beginning-of-period sentiment index. This result supports Hypothesis 4, which posits that the poor relative return performance of recommended stocks during periods of bullish sentiment is no longer observed after controlling for growth factors. It thus supports the argument that the poor relative performance of recommended stocks after periods of bullish sentiment is induced by analysts’ biased views on growth stocks during those periods.

### 6.3 Effects of other stock characteristics

In this section, to check the robustness of our results, we analyze the possibility that the effect of sentiment on the relative return performance of stocks with other characteristics accounts for the poor relative performance of recommended stocks after periods of bullish sentiment.

#### 6.3.1 Momentum and size effects

We first distinguish the effects of sentiment on the relative return performance of recommended stocks from the well-known co-movements of size and momentum effects. Baker and Wurgler report that when beginning-of-period proxies for investor sentiment are low, subsequent returns are relatively high for small stocks. Further, Antoniou et al. (2013) have shown that investor sentiment is

positively associated with the profitability of price momentum strategies.

Therefore, we examine whether size and momentum effects account for our results. To this end, we regress subsequent stock returns on the decile ranks of *SIZE* (market capitalization) and *MOMENTUM* (returns from  $t - 12$  months to  $t - 2$  months), in addition to REC, as follows:

$$R_{i,t+1} = \alpha_{Gt} + \beta_{G0t} REC_{i,t} + \beta_{G1t} dMOMENTUM_{i,t} + \beta_{G2t} dSIZE_{i,t} + \varepsilon_{Gt,t} \quad (9)$$

Here,  $dMOMENTUM$ , and  $dSIZE$  are the decile ranks of *SIZE* and *MOMENTUM*, respectively. The coefficient  $\beta_{G0t}$  can be regarded as a proxy for the relative performance of recommended stocks, after controlling for size and momentum effects. The coefficient of REC ( $\beta_{G0t}$ ) in model (9) is regressed on the sentiment index as follows:

$$\beta_{G0t} = c_{Gk} + d_{Gk} SENTIMENT_{k,t} + e_{Gk,t} \quad (10)$$

The coefficient  $d_{Gk}$  is estimated with the WLS method, where the reciprocal of the square of the standard error of the coefficient  $\beta_{G0t}$  in the regression model (9) is used as a weight.

We control for size and momentum effects by including the size and momentum factors in regression model (9), and not by including the Carhart momentum and Fama-French SMB factors as independent variables in regression model (10), because these effects on the relative returns of recommended stocks are time-varying. Figure 2 plots the spreads in  $dSIZE$  and  $dMOMENTUM$  between the top-REC quintile (recommended stocks) and the bottom-REC quintile (least favorably recommended stocks). As shown in Figure 2, the spreads in these variables are time-varying. For example, during the dot-com bubble and the global financial crisis,  $dSIZE$  is higher for recommended stocks than for the stocks least favorably recommended, while after the burst of the bubble and the crisis,  $dSIZE$  is lower for recommended stocks than for the stocks least favorably recommended. In addition, the spread in  $dMOMENTUM$  fluctuates greatly over the short run. This indicates that we should control for size and momentum effects at the end of each month, and therefore, we include the size and momentum factors in regression model (9).

Our results, as shown in Table 3 in the “Size & momentum adjusted” column, reveal that the coefficient  $d_{Gk}$  is significantly negative. These results indicate that the relative returns of recommended stocks are significantly negatively associated with investor sentiment, even after controlling for size and momentum effects. Thus, it is unlikely that the size and momentum effects account for the negative sentiment effect on the relative return of recommended stocks.

[Figure 2]

### 6.3.2 Effects of sentiment on difficult-to-value stocks

Baker and Wurgler report that bullish investor sentiment lowers the subsequent stock returns of difficult-to-value stocks. Although we are unable to observe any strong effect of sentiment on analysts' recommendations for difficult-to-value stocks in our study<sup>15</sup>, it is possible that this effect of sentiment accounts for the poor relative return performance of recommended stocks during periods of bullish sentiment.

To assess this, we regress subsequent stock returns on the decile ranks of difficult-to-value characteristics, in addition to *dSIZE*, *dMOMENTUM*, and *REC*, as follows:

$$R_{i,t+1} = \alpha_{H_t} + \beta_{H0_t} REC_{i,t} + \beta_{H1_t} dMOMENTUM_{i,t} + \beta_{H2_t} dSIZE_{i,t} + \beta_{H3_t} dAGE_{i,t} + \beta_{H4_t} dVOLATILITY_{i,t} + \beta_{H5_t} dESG_{i,t} + \beta_{H6_t} dEEF_{i,t} + \beta_{H7_t} NE_{i,t} + \beta_{H8_t} NP_{i,t} + \varepsilon_{H_{i,t}} \quad (11)$$

Here, *dAGE* and *dVOLATILITY* are the decile ranks of *AGE* (the number of years since a firm's foundation year<sup>16</sup>) and *VOLATILITY* (the standard deviation of monthly returns over 12 months), respectively. *dESG* represents extremeness in sales growth. We first calculate vigintile ranks for sales growth (the change in net sales divided by prior-year net sales) minus 10.5, and then define *dESG* as the absolute value of the rank minus 0.5. *dESG* has a value of 1, 2, 3, ..., 9, or 10, with a higher value representing a more extreme level of sales growth. *dEEF* represents extremeness in external financing. We first calculate vigintile ranks for external financing (the change in assets minus the change in retained earnings divided by assets) minus 10.5, and then define *dEEF* as the absolute value of the rank minus 0.5. *dEEF* has a value of 1, 2, 3, ..., 9, or 10, with a higher value representing a more extreme level of external financing. *NE* is a binary variable that takes on a value of 1 if earnings are less than 0, and takes on a value of 0 otherwise. *NP* is a binary variable that has a value of 1 if a firm is non-dividend-paying, and otherwise has a value of 0. In Baker and Wurgler's study, these characteristic indicators (*dAGE*, *dVOLATILITY*, *dESG*, *dEEF*, *NE*, *NP*) and the firm size characteristic (*dSIZE*) are used to distinguish difficult-to-value stocks from others. In accordance with Baker and Wurgler's study, difficult-to-value stocks were regarded as including small stocks (stocks with low *dSIZE*), young stocks (stocks with low *dAGE*), high-volatility stocks (stocks with high *dVOLATILITY*), negative earnings stocks (stocks for which *NE*=1), non-dividend-paying stocks (stocks for which *NP*=1), extreme growth stocks (stocks with high *dESG*), and stocks with extremely high and low external financing (stocks with high *dEEF*).<sup>17</sup>

<sup>15</sup> A more detailed analysis of sentiment's effect on analysts' views on difficult-to-value stocks is presented in the Appendix.

<sup>16</sup> In Baker and Wurgler's study, *AGE* is the number of years since a firm's first appearance on CRSP. However, there are several well-established firms that have long histories, but which are not listed on stock markets until recently. It is for this reason that we define age as the number of years since a firm's foundation year.

<sup>17</sup> In Baker and Wurgler's study, stocks with low asset tangibility and extreme BP stocks are also regarded as difficult-to-value stocks. However, since the sentiment effect on the relative returns of these stocks is not observed in their study, we do not include these characteristics as control variables in equation (11).

Thus, the coefficient of REC ( $\beta_{H0_t}$ ) can be regarded as a proxy for the relative performance of recommended stocks, after controlling for the effects of the momentum characteristic and difficult-to-value characteristics. We regress the coefficient  $\beta_{H0_t}$  on the sentiment index in the following manner:

$$\beta_{H0_t} = c_{Hk} + d_{Hk} SENTIMENT_{k,t} + e_{Hk,t} \quad (12)$$

The coefficient  $d_{Hk}$  is estimated by using the WLS method, with the reciprocal of the square of the standard error of the coefficient  $\beta_{H0_t}$  in the regression model (11) used as a weight.

The regression results, shown in Table 3 in the “Size, momentum, & DV adjusted” column, reveal that the coefficient  $\beta_{H0_t}$  is significantly negatively associated with the two sentiment indices. This result indicates that the relative returns for recommended stocks are significantly negatively associated with investor sentiment, even after the effect of difficult-to-value characteristics is controlled for. Thus, it is unlikely that the effect of sentiment on difficult-to-value stocks accounts for the poor relative return performance of recommended stocks during periods of bullish sentiment.

## 7. Earnings estimation or discount rate estimation errors

In this study, we focus on analysts’ preference for growth investing as the reason for their excessive sensitivity to market-wide sentiment. Since evaluations of firms’ growth components are highly sensitive to discount rate estimations, we predict that bullish market-wide sentiment would result in analysts’ excessive optimism about growth stocks, due to irrationally low discount rate estimations. On the other hands, since analysts’ earnings forecasts are influenced by market-wide sentiment (Hribar and McInnis, 2012; Walther and Willis, 2013), their excessive optimism about growth stocks can be attributed to earnings forecast optimism about those stocks. In other words, during periods of bullish sentiment, stocks with high growth potential tend to receive buy recommendations due to upwardly biased earnings forecasts.

If this is the case, recommended stocks will also experience more negative earnings forecast revisions, which could have a negative impact on relative return performance of those stocks, following periods of higher investor sentiment. With this in mind, we perform a two-step regression analysis to test this possibility. Subsequent earnings revisions (earnings revisions over month  $t+1$ ) are regressed on consensus recommendations as:

$$Rev_{h,i,t+1} = \alpha_{1h,t} + \beta_{1h,t} REC_{i,t} + \varepsilon_{1h,i,t} \quad (h=1,2) \quad (13)$$



$Rev_{h,i,t+1}$  ( $h=1, 2$ ) denote revisions of long-term earnings growth and the current fiscal year EPS forecast for firm  $i$  over month  $t+1$ , respectively.<sup>18</sup>  $Rev_{h,i,t+1}$  is defined as:

$$Rev_{1,i,t+1} \equiv fLTG_{i,t+1} - fLTG_{i,t}$$

$$Rev_{2,i,t+1} \equiv (fEPS_{i,y_{t+1}+1,t+1} - fEPS_{i,y_{t+1}+1,t}) / P_{i,t}$$

Here,  $fLTG_{i,t}$  is the consensus long-term earnings growth forecast at the end of month  $t$ .  $y_t$  is the most recent fiscal year in which an earnings announcement was made at the end of month  $t$  (thus,  $y_{t+1} + 1$  indicates the current unreported fiscal year at the end of month  $t+1$ ).  $fEPS_{i,y_{t+1}+1,t}$  is the consensus EPS forecast for fiscal year  $y_{t+1}+1$  at the end of month  $t$ .  $P_{i,t}$  is the stock price at the end of month  $t$ .

The coefficient  $\beta_1$  in regression model (13) can be regarded as a proxy for the extent to which recommended stocks receive more positive (or less negative) earnings forecast revisions relative to less favorably recommended stocks. We regress this coefficient on the sentiment index as follows:

$$\beta_{1h,t} = c_{1h,k} + d_{1h,k} SENTIMENT_{k,t} + e_{1h,k,t} \quad (14)$$

The coefficient  $d_{1h,k}$  is estimated with the WLS method, with the reciprocal of the square of the standard error of the coefficient  $\beta_{1h,t}$  in the regression model (13) used as a weight. A positive (negative)  $d_{1h,k}$  indicates that recommended stocks experience more positive or less negative (less positive or more negative) earnings forecast revisions after a period of higher sentiment.

Our results, as shown in Table 4, reveal that the coefficient  $\beta_1$  (the dependent variable in formula (14)) for EPS revisions is significantly positive, indicating that recommended stocks experience more positive EPS earnings forecast revisions than the stocks that are the less favorably recommended. In addition, our findings show that the coefficient  $d_1$  for EPS revisions ( $d_{12,1}$  and  $d_{12,2}$ ) is significantly positive, indicating that recommended stocks experience more positive EPS forecast revisions than those that are less favorably recommended, especially after periods of bullish sentiment. The results also reveal that the coefficients of  $d_1$  for LTG revisions ( $d_{11,1}$  and  $d_{11,2}$ ) are not significantly negative. In sum, our results in no way indicate that recommended stocks experience more negative earnings forecast revisions after periods of higher sentiment. It is thus unlikely that recommended stocks experience stronger corrections in their earnings forecasts after periods of higher investor sentiment.

If excessively favorable recommendations for growth stocks during periods of bullish sentiment can be attributed to irrationally low discount rate estimations, recommended stocks will not always

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<sup>18</sup> To reduce the influence of the outliers on our results, we winsorized the revision variables for each month at their first and 99th percentiles.

experience more negative earnings forecast revisions after periods of higher sentiment. Thus, the optimism for growth stocks during periods of bullish sentiment is likely to result from irrationally low discount rate estimations rather than earnings forecast optimism during such periods.

[Table 5]

## **8. Conclusion**

Previous studies have argued that market-wide sentiment primarily affects individual noise traders (De Long et al., 1990; Shleifer and Summers, 1990; Lee et al., 1991). Contrary to this view, in this study, we show that financial analysts, who are sophisticated market participants, may be more vulnerable to sentiment than other market participants. We focus on analysts' preference for growth investing as the reason for their vulnerability to sentiment, and predict that, due to this preference, their fair value estimates for growth stocks would be more upwardly biased by bullish market-wide sentiment than those of other market peers. As a result, financial analysts may consider growth stocks to be undervalued, especially during periods of bullish sentiment. In addition, we predict that this excessive influence of market-wide sentiment would not be aligned with the investment value of their stock recommendations. More specifically, we argue that financial analysts' optimism about growth stocks during periods of bullish sentiment could lower the relative performance of recommended stocks.

In accordance with our predictions, we find that growth stocks receive more favorable stock recommendations after periods of higher investor sentiment, although those stocks are more overvalued during such periods. Furthermore, our results reveal that the relative return performance of recommended stocks is lower when market-wide investor sentiment is higher. This negative association continues to be observed even when we control for momentum and difficult-to-value characteristics. However, it is no longer observed when we control for growth characteristics. These results support the inference that the poor relative performance of recommended stocks during periods of bullish sentiment is induced by analysts' biased views about growth stocks. Finally, our results suggest that optimism about growth stocks is attributable to irrational discount rate estimations, rather than to their earnings forecast errors.

Our analyses raise the possibility that sentiment could primarily affect professional financial analysts, who are considered more sophisticated market participants than individual noise traders. Thus, our findings suggest that not only noise-trader-driven sentiment effects exist for asset prices, but also financial-analyst-driven sentiment effects.

Compared with individual noise traders, financial analysts are well-experienced, and their experience might reduce the influence of sentiment on their stock recommendations. However, unlike individual noise traders, their activity is heavily affected by their companies' economic incentives, which could result in their excessive preference for growth investing. Therefore, their companies' economic incentives may make analysts more vulnerable to market-wide sentiment, by inducing a strong preference for growth investing.

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## Appendix

For this study, we carry out an analysis of whether difficult-to-value stocks receive more favorable recommendations during periods of higher sentiment. First, we evaluate analysts' bullish views on difficult-to-value stocks, based on the differences in difficult-to-value characteristics between recommended stocks and the least favorably recommended stocks.<sup>19</sup> In terms of difficult-to-value characteristics, we utilize the firm size variable ( $dSIZE$ ), firm age ( $dAGE$ ), volatility ( $dVOLATILITY$ ), the negative earnings indicator ( $NE$ ), the non-dividend-paying indicator ( $NP$ ), the extreme growth indicator ( $dESG$ ), and the extreme external financing indicator ( $dEEF$ ), which are defined in detail in Section 6.3.2. Stocks with low  $dSIZE$  and  $dAGE$  are difficult-to-value stocks, while stocks with high  $dVOLATILITY$ ,  $NE$ ,  $NP$ ,  $dESG$ , and  $dEEF$  are difficult-to-value stocks. To make this easier to understand, we utilize the inversed-ranked  $dSIZE$  and  $dAGE$ , instead of the raw values of those variables, so that higher values for each difficult-to-value variable indicate greater difficult-to-value properties.

For the end of each month, we calculate the averages of the difficult-to-value characteristics for each recommendation quintile. If the values are higher for REC5 than for REC1, it means that analysts are likely to consider difficult-to-value stocks to be attractive (undervalued).

After evaluating analysts' aggressive views on difficult-to-value stocks at the end of each month, we examine the association between market-wide investor sentiment and time-varying analysts' views on difficult-to-value stocks. We run regressions of the following type:

$$\begin{aligned} Spread\_DF_{s,t} &\equiv DF_{s,REC_{s,t}=High,t} - DF_{s,REC_{s,t}=Low,t} \\ &= c_{Jk,s} + d_{Jk,s} SENTIMENT_{k,t} + e_{Jk,s,t} \end{aligned} \tag{A.1}$$

Here,  $DF_{s,REC_{s,t}=High,t}$  ( $s=1, 2, \dots, 7$ ) denote the average values of inversed ranked  $dAGE$ ,  $dVOLATILITY$ ,  $dEEF$ ,  $NE$ ,  $NP$ ,  $dESG$ , and inversed ranked  $dSIZE$  for the recommended stock group (REC5), respectively.  $DF_{s,REC_{s,t}=Low,t}$  denote the average values of these variables for the least favorably recommended stocks (REC1).  $Spread\_DF_{s,t}$  denote the difference in difficult-to-value characteristics between recommended stocks and the stocks least favorably recommended. Positive coefficients of  $SENTIMENT$  ( $d_j > 0$ ) imply that analysts consider difficult-to-value stocks to be more undervalued during periods of higher sentiment.

The regression results are shown in Table A.1. The results are quite mixed.  $Spread\_DF$  is

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<sup>19</sup> Since the non-payout variable and negative earnings variable are binary variables, we do not evaluate analysts' views on difficult-to-value stocks by Spearman rank correlation.

significantly positively associated with either of the sentiment indices when inverse-ranked *dAGE*, *dVOLATILITY*, *NE*, and *NP* are used as the indicators. However, *Spread\_DF* for *dESG* and *dEEF* is not significantly associated with the indices. In addition, *Spread\_DF* for inverse-ranked *dSIZE* is negatively associated with the indices. Thus, the results do not support the argument that difficult-to-value stocks receive more favorable recommendations during periods of higher sentiment. Sentiment's effects on analysts' recommendations for difficult-to-value stocks may thus be limited.

[Table A.1]

**Table 1****Sentiment and relative performance of growth stocks**

Weighted least squares regression results for Eq. (2) are shown in this table. The “Average” row shows time-series averages for the dependent variables from Eq. (2). “Max”/“Min”/“SD” are the maximum value/minimum value/standard deviation of the dependent variables, respectively. The “BW Idx” row presents the coefficients of the index constructed by BW. The “Michigan Idx” row shows the coefficients of the Michigan consumer sentiment index. The “SG,” “LTG,” “TURN,” “BP,” and “EP” columns show the regression results when dSG, dLTG, dTURN, dBP, and dEP are used as growth indicators, respectively. The figures in parentheses are simple t-statistics. \*\* indicates one-sided statistical significance at 5%.

		<i>SG</i>	<i>LTG</i>	<i>TURN</i>	<i>BP</i>	<i>EP</i>
Dependent Variable	Average	-0.00040 (1)	-0.00025 (0.37)	0.00008 (0.14)	0.00054 (1.16)	0.00063 (1.16)
	Max	0.0226	0.0398	0.0417	0.0221	0.0298
	Min	-0.0251	-0.0344	-0.0316	-0.0367	-0.0402
	SD	0.0058	0.0094	0.0089	0.0066	0.0078
Coefficient of Sentiment Idx	<i>BW Idx</i>	-0.0025 (3.76**)	-0.0041 (3.79**)	-0.0033 (3.28**)	-0.0022 (2.94**)	-0.0040 (4.8**)
	<i>Michigan Idx</i>	-0.00006	-0.00015	-0.00010	-0.00006	-0.00010
	<i>Idx</i>	(1.93**)	(2.73**)	(1.88**)	(1.75**)	(2.44**)



**Table 2**  
**Sentiment and analysts' views on growth stocks**

Ordinary least squares regression results for Eq. (3) and Eq. (4) are shown in Table 2(a) and Table 2(b), respectively. The "Average" row presents time-series averages of the dependent variables of Eq. (3) and Eq. (4). "Max"/"Min"/"SD" show the maximum value/minimum value/standard deviation of the dependent variables, respectively. The "B&W Idx" row presents the coefficients for the index constructed by BW. The "Michigan Idx" row presents the coefficients of the Michigan consumer sentiment index. The "SG," "LTG," "TURN," "BP," and "EP" columns show the regression results when dSG, dLTG, dTURN, dBP, and dEP are used as growth indicators, respectively. The figures in parentheses in the results for the dependent variables are the autocorrelation-consistent t-statistics (lag = 12) used by Jegadeesh et al. (2004). The figures in parentheses in the results for the coefficients are t-statistics based on Newey-West standard errors (lag = 12). \*\* indicates one-sided statistical significance at 5%.

(a) Spearman Rank Correlations

		<i>SG</i>	<i>LTG</i>	<i>TURN</i>	<i>BP</i>	<i>EP</i>
Dependent Variable	Average	0.290 (22.75**)	0.370 (13.02**)	0.126 (3.34**)	0.259 (12.56**)	0.104 (3.44**)
	Max	0.39	0.52	0.31	0.39	0.30
	Min	0.13	0.21	-0.11	0.12	-0.13
	SD	0.052	0.088	0.116	0.067	0.100
Coefficient of Sentiment Idx	<i>BW Idx</i>	0.020 (1.12)	0.044 (0.62)	0.074 (1.6)	0.051 (2.29**)	0.093 (2.16**)
	<i>Michigan Idx</i>	0.0031 (2.83**)	0.0044 (3.74**)	0.0079 (6.02**)	0.0035 (3.93**)	0.0050 (3.46**)

(b) Spreads in Decile Ranks of Growth Characteristics

		<i>SG</i>	<i>LTG</i>	<i>TURN</i>	<i>BP</i>	<i>EP</i>
Dependent Variable	Average	2.43 (20.9**)	3.12 (16.88**)	1.07 (3.74**)	2.13 (12.98**)	0.87 (3.75**)
	Max	3.119	4.148	2.347	3.256	2.345
	Min	1.202	1.810	-0.880	1.037	-1.041
	SD	0.442	0.599	0.894	0.542	0.782
Coefficient of Sentiment Idx	<i>BW Idx</i>	0.161 (1.23)	0.322 (0.97)	0.559 (1.92**)	0.385 (2.21**)	0.653 (2.19**)
	<i>Michigan Idx</i>	0.0253 (2.92**)	0.0261 (3.29**)	0.0596 (5.25**)	0.0256 (3.51**)	0.0357 (3.2**)

**Table 3****Sentiment and relative performance of recommended stocks**

The weighted least squares regression results for Eq. (6), Eq. (8), Eq. (10), and Eq. (12) are shown in this table. The “Average” row presents time-series averages of the dependent variables of the equations. “Max”/“Min”/“SD” show the maximum value/minimum value/standard deviation of the dependent variables, respectively. The “B&W Idx” row shows the coefficients of the index constructed by BW. The “Michigan Idx” row shows the coefficients of the Michigan Consumer Sentiment Index. The “Un-adjusted,” “Growth characteristics adjusted,” “Size & momentum adjusted,” and “Size, momentum, & DV adjusted” columns show the regression results for Eq. (8), Eq. (10), Eq. (12), and Eq. (14), respectively. The figures in parentheses are simple t-statistics. \*\* indicates one-sided statistical significance at 5%.

		<i>Un-adjusted</i>	<i>Glamour characteristics adjusted</i>	<i>Size &amp; momentum adjusted</i>	<i>Size, momentum, &amp; DV adjusted</i>
Dependent Variable	Average	-0.0005 (0.27)	0.0008 (0.82)	-0.0017 (1.22)	-0.0013 (1.37)
	Max	0.1035	0.0415	0.0691	0.0655
	Min	-0.0935	-0.0558	-0.0822	-0.0666
	SD	0.0244	0.0142	0.0199	0.0141
Coefficient of Sentiment Idx	<i>BW Idx</i>	-0.0078 (2.54**)	0.0022 (1.21)	-0.0079 (3.06**)	-0.0050 (2.6**)
	<i>Michigan Idx</i>	-0.00031 (2.04**)	0.00004 (0.47)	-0.00035 (2.72**)	-0.00022 (2.31**)

**Table 4****Earnings forecast errors for recommended stocks**

The weighted least squares regression results for Eq. (14) are shown in the table. The “Average” row shows time-series averages of dependent variables of the equation. “Max”/“Min”/“SD” show the maximum value/minimum value/standard deviation of the dependent variables, respectively. The “B&W Idx” row shows the coefficients of the index constructed by BW. The “Michigan Idx” row shows the coefficients of the Michigan Consumer Sentiment Index. The “LTG revision” and “EPS revision” columns show the regression results when the association between stock recommendations and subsequent one-month revisions in LTG forecasts and forecasts of FY1 earnings are analyzed, respectively. The figures in parentheses are simple t-statistics. \*\* indicates one-sided statistical significance at 5%.

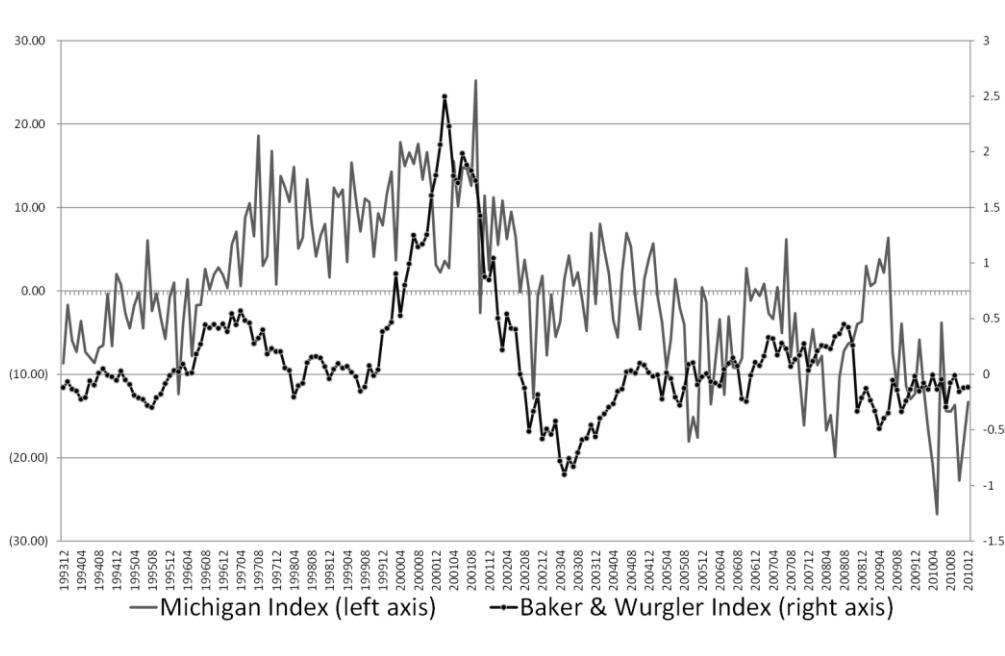
		<i>LTG revision</i>	<i>EPS revision</i>
Dependent Variable	Average	-0.005 (0.93)	0.001 (9.87**)
	Max	0.22	0.01
	Min	-0.33	0.00
	SD	0.07	0.00
	Coefficient of Sentiment Idx	<i>BW Idx</i> (0.13)	0.00033 (4.78**)
	<i>Michigan Idx</i>	0.00021 (0.47)	0.00001 (1.77**)

**Table A.1****Sentiment and analysts' views on difficult-to-value stocks**

Ordinary least squares regression results for Eq. (A.1) in the text are shown in this table. The "Average" row presents time-series averages of the dependent variables of Eq. (A.1). "Max"/"Min"/"SD" present the maximum value/minimum value/standard deviation of the dependent variables, respectively. The "B&W Idx" row presents the coefficients for the index constructed by BW. The "Michigan Idx" row presents the coefficients of the Michigan Consumer Sentiment Index. The "AGE," "VOLATILITY," "EF," "NE," "NP," "ESG," and "SIZE" columns show the regression results for when inversed-ranked *dAGE*, *dVOLATILITY*, *dEEF*, *NE*, *NP*, *dESG*, and inversed-ranked *dSIZE* are used as difficult-to-value indicators, respectively. The figures in parentheses in the results for the dependent variables are the autocorrelation consistent t-statistics (lag = 12). The figures in parentheses in the results for the coefficients are t-statistics based on Newey-West standard errors (lag = 12). \*\* indicates one-sided statistical significance at 5%.

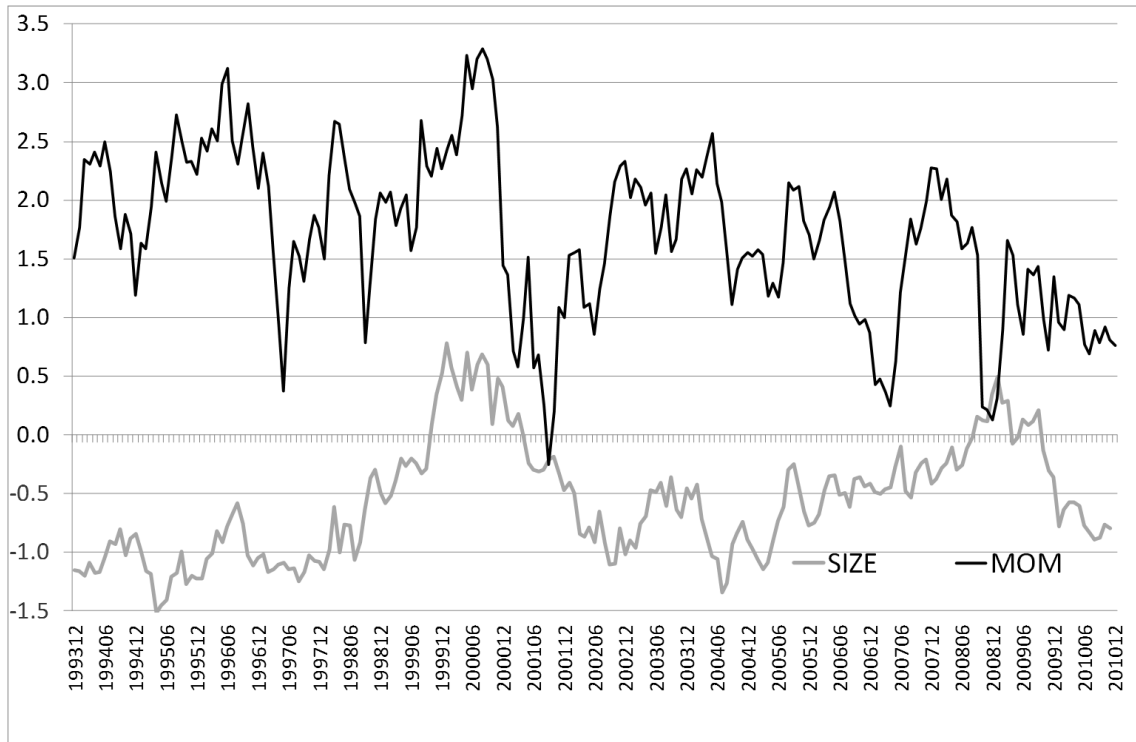
		<i>AGE</i>	<i>VOLATILITY</i>	<i>EF</i>	<i>NE</i>	<i>NP</i>	<i>ESG</i>	<i>SIZE</i>
Dependent Variable	Average	1.16 (7.3**)	1.22 (5.1**)	0.75 (6.82**)	-0.01 (0.34)	0.36 (19.93**)	0.20 (2.33**)	0.72 (4.66**)
	Max	1.935	2.582	1.573	0.207	0.487	1.041	1.707
	Min	0.231	-1.165	0.026	-0.154	0.192	-0.723	-0.722
	SD	0.494	0.795	0.368	0.066	0.063	0.357	0.540
Coefficient of Sentiment Idx	<i>BW Idx</i>	0.413 (2.77**)	0.456 (0.9)	0.084 (0.56)	0.084 (4.67**)	0.046 (1.64)	0.129 (0.95)	-0.340 (1.98**)
	<i>Michigan Idx</i>	0.0255	0.0302	0.0069	0.0029	0.0025	0.0023	-0.0111
	<i>Idx</i>	(6.15**)	(2.8**)	(1.33)	(2.3**)	(3.58**)	(0.48)	(0.75)

**Figure 1**  
**Sentiment indices**



This figure presents the monthly values for the BW investor sentiment index (Baker & Wurgler Index) and the Michigan Consumer Sentiment Index (Michigan Index). To ensure that both indices are free of macroeconomic influences, in accordance with the work of Baker and Wurgler, we conduct our investigation by using an orthogonal version of the indices, which we obtain by regressing the indices for a set of macroeconomic variables.

**Figure 2**  
**Size and momentum exposures**



The graph shows the differences in monthly values of decile ranks of market capitalization (SIZE), and the returns from  $t - 12$  months to  $t - 2$  months (MOMENTUM), between the top-REC quintile and bottom-REC quintile.