INVESTOR SENTIMENT, EXTRAPOLATION AND ASSET PRICING

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Abstract

We develop an asset pricing model with investor sentiment and extrapolative behavior by assuming that there are many investors in the market who form their stock demand by weighting the sentiment signal, the extrapolative signal and the value signal. Our model predicts that both investor sentiment and extrapolation impose positive effects on the stock price deviation from fundamental value, and the direction and magnitude of stock price deviation depend on the relative strength of the sentiment signal and the extrapolation signal. Futhermore, we find that the weights of the sentiment signal and the extrapolative signal are positively related to the short-term correlation of stock returns, while the lagged weight of sentiment signal negatively effects the short-term correlation of stock returns. Moreover, the model also predicts that the sentiment signal and extrapolative signal weights are positively correlated with stock volatility, and extrapolative behavior exacerbates the sentiment-driven stock volatility due to extrapolating endogenous stock returns. Finally, we find empirical evidence consistent with the model's predictions.

Keywords: investor sentiment; extrapolation; price deviation; return correlation; excess volatility
JEL Classification: G12; G14

Appendix

Appendix A

Following Barberis et al. (2018), for simplicity, we assume that the investor takes the conditional distribution of the future price change to be normal, i.e., $p_{t+1}-p_t \sim N\left(E_t^N\left(p_{t+1}-p_t\right), Var_t^N\left(p_{t+1}-p_t\right)\right)$. Thus,

$$E_t\left(-\exp(-\gamma W_{t+1}\right)=-\exp\left(-\gamma W_t\right)\exp\left(-\gamma N_t^N E_t^N\left(p_{t+1}-p_t\right)+\frac{\gamma^2}{2}\left(N_t^N\right)^2 Var_t^N\left(p_{t+1}-p_t\right)\right) \quad \text{(A1)}$$

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The first-order condition gives the optimal demand is

$$N_t^N = \frac{E_t^N\left(p_{t+1}-p_t\right)}{\gamma Var_t^N\left(p_{t+1}-p_t\right)}. \tag{A2}$$

Appendix B

The change of stock price at date 1 is

$$p_1-p_0=\varepsilon_1+\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\Delta S_1+\left(\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}-\frac{\left(1-\mu^F\right)w_{2,0}}{\mu^F+\left(1-\mu^F\right)w_{1,0}}\right)\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}S_0$$
$$+\left(1+\frac{1}{\mu^F+\left(1-\mu^F\right)w_{1,0}}-\frac{1}{\left(\mu^F+\left(1-\mu^F\right)w_{1,1}\right)}\right)Q\gamma\sigma_\varepsilon^2, \tag{B1}$$

The change of stock price at date 2 is

$$p_2-p_1=\varepsilon_2+\left(\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}-\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right)\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\Delta S_1+\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\Delta S_2$$
$$+\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\beta\left(p_1-p_0\right)+\left(\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}-\frac{\left(1-\mu^F\right)\left(1-w_{1,1}\right)}{\left(\mu^F+\left(1-\mu^F\right)w_{1,1}\right)}\right)\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}S_0 \tag{B2}$$
$$+\left(1+\frac{1}{\mu^F+\left(1-\mu^F\right)w_{1,1}}-\frac{1}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\right)Q\gamma\sigma_\varepsilon^2,$$

The change of stock price at date 3 is

$$p_3-p_2=\varepsilon_3-\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\Delta S_1-\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\Delta S_2$$
$$-\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}S_0-\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\beta\left(p_1-p_0\right)+\frac{Q\gamma\sigma_\varepsilon^2}{\mu^F+\left(1-\mu^F\right)w_{1,2}}, \tag{B3}$$

Thus, the short-term covariance of stock price changes can be given by

$$Cov(p_2-p_1,p_1-p_0)=\left(\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}-\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right)\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}Cov(\Delta S_1,\varepsilon_1)$$
$$+\left(\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}-\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right)\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\left(\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\right)^2\sigma_\eta^2+\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\beta Var(p_1-p_0)$$

$$
\begin{aligned}
&=\left(\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}-\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right)\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}Cov(\Delta S_1,\varepsilon_1)\\
&+\left(\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}-\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right)\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\left(\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\right)^2\sigma_\eta^2\\
&+\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\beta\left(\sigma_\varepsilon^2+\left(\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right)^2\left(\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\right)^2\sigma_\eta^2+2\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}Cov(\Delta S_1,\varepsilon_1)\right),
\end{aligned}
$$

$$
\begin{aligned}
&=\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\beta\sigma_\varepsilon^2\\
&+\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\left(\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}-\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}+\frac{\beta\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right)\left(\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\right)\sigma_\varepsilon^2\\
&+\left(\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}-\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}+\frac{2\beta\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right)\rho_1\left(\frac{\sigma_\varepsilon}{\sigma_\eta}\right)\sigma_\varepsilon^2
\end{aligned}
$$

$$
=a\sigma_\varepsilon^2+b\left(\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\right)\sigma_\varepsilon^2+c\rho_1\left(\frac{\sigma_\varepsilon}{\sigma_\eta}\right)\sigma_\varepsilon^2, \tag{B4}
$$

where

$$
a=\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\beta, \tag{B5}
$$

$$
b=\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\left(\begin{array}{l}\dfrac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}-\dfrac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\\ +\beta\dfrac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\dfrac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\end{array}\right), \tag{B6}
$$

$$
c=\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}-\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}+\frac{2\beta\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}. \tag{B7}
$$

Moreover, the long-term covariance of stock price changes can be given by

$$Cov(p_3-p_2,p_1-p_0)=-\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}Cov\left(\Delta S_1,\varepsilon_1\right)$$

$$-\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\left(\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\right)^2\sigma_\eta^2-\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\beta Var\left(p_1-p_0\right)$$

$$=-\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}Cov(\Delta S_1,\varepsilon_1)-\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\left(\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\right)^2\sigma_S^2$$

$$-\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\beta\left(\sigma_\varepsilon^2+\left(\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right)^2\left(\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\right)^2\sigma_S^2+2\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}Cov(\Delta S_1,\varepsilon_1)\right)$$

$$=-\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\beta\sigma_\varepsilon^2$$

$$-\left(\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}+\beta\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\left(\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right)^2\right)\left(\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\right)\sigma_\varepsilon^2$$

$$-\left(2\beta\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}+\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\right)\rho_1\left(\frac{\sigma_\varepsilon}{\sigma_\eta}\right)\sigma_\varepsilon^2$$

$$=-a\sigma_\varepsilon^2-d\left(\frac{\sigma_\varepsilon^2}{\sigma_\eta^2}\right)\sigma_\varepsilon^2-e\rho_1\left(\frac{\sigma_\varepsilon}{\sigma_\eta}\right)\sigma_\varepsilon^2, \quad \text{(B8)}$$

where

$$d=\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\left(\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}+\beta\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}\right),$$

(B9)

$$e=\frac{\left(1-\mu^F\right)w_{2,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}+2\beta\frac{\left(1-\mu^F\right)w_{3,2}}{\mu^F+\left(1-\mu^F\right)w_{1,2}}\frac{\left(1-\mu^F\right)w_{2,1}}{\mu^F+\left(1-\mu^F\right)w_{1,1}}. \quad \text{(B10)}$$

Appendix C

Table C1. Two-way portfolio sorts on Investor sentiment and extrapolation

	E1	*E2*	*E3*	*E4*	*E5*	*E5-E1*
S1	-0.1505* (-1.88)	-0.1867*** (-3.14)	-0.2363*** (-4.71)	-0.2066*** (-4.32)	-0.0375*** (0.82)	0.1881*** (2.89)
S2	-0.1072* (-1.81)	-0.1638*** (-3.08)	-0.1907*** (-3.94)	-0.1426*** (-3.07)	0.0723 (1.53)	0.1796*** (4.12)
S3	-0.0410 (-0.72)	-0.0971* (-1.88)	-0.1240*** (-2.69)	-0.0647 (-1.41)	0.1531*** (3.08)	0.1941*** (3.31)
S4	0.0673 (1.15)	-0.0197 (-0.40)	-0.0308 (-0.67)	0.0157 (1.15)	0.2630*** (5.21)	0.1956*** (6.03)
S5	0.3103*** (5.90)	0.1973*** (4.17)	0.2285*** (4.90)	0.3281*** (6.67)	0.5650*** (11.08)	0.2548*** (9.61)
S5-S1	0.4608*** (7.41)	0.3839*** (10.42)	0.4648*** (15.08)	0.5347*** (17.52)	0.5275*** (12.71)	

*Note: This table reports the average stock price deviation for portfolios formed by sorting on investor sentiment and extrapolation. In month t, we sort stocks into quintiles based on investor sentiment and sort stocks independently into quintiles based on extrapolation. S1, E1 are the bottom t quintiles of investor sentiment and extrapolation, respectively. S5 and E5 are the top quintiles of investor sentiment and extrapolation, respectively. S5-S1 and E5-E1 are the difference between the top and the bottom quintiles of investor sentiment and extrapolation, respectively. The corresponding t statistics based on Newey-West standard errors with 5-month lags are in parentheses, *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively. The sample period covers from January 2000 to December 2021.*

Table C2. Investor sentiment, extrapolation and price deviation: Fama–Macbeth regressions.

Variables	(1)	(2)	(3)	(4)
Intercept	0.0012 (0.06)	-0.0353 (-1.08)	-0.0208 (-1.29)	-0.0084 (-0.21)
$Sent^{\perp}_{i,t}$		0.3037*** (15.04)		0.3756*** (12.79)
$Extrap^{\perp}_{i,t}$			0.0634*** (2.85)	0.4088*** (20.13)
$Rmrf_t$	0.3741*** (3.94)	0.4237*** (4.27)	0.3829*** (4.0029)	0.5035*** (5.93)
Smb_t	0.8841*** (4.86)	0.5950*** (3.93)	0.8380*** (4.54)	0.4884*** (3.77)
Hml_t	0.0728 (0.33)	-0.2515 (-1.51)	0.0901 (0.41)	-0.2112 (-1.31)
No.Obs	476,030	452,750	452,750	452,750
$Avg.adj.R^2$	0.0350	0.2942	0.0477	0.3617
No. of months	264	251	251	251

Note: This table reports the Fama–Macbeth regressions of the monthly stock price deviation on investor sentiment and extrapolation. In the first step, we estimate the cross-sectional statistics among selected variables for each month. Then, in the second step, we calculate the time-series average and standard deviation of cross-sectional statistics obtained in the first step, and we conduct the corresponding confidence test based on these measures. $Sent^{\perp}_{i,t}$ *is the investor sentiment of stock i in month t.* $Extrap^{\perp}_{i,t}$ *is the individual stock extrapolation of stock i in month t.* $Rmrf_t$, Smb_t *and* Hml_t *are Fama-French three factors over month t. The corresponding t statistics based on Newey-West standard errors with 5-month lags are in parentheses,* $*, **$ *and* $***$ *indicate significance at 10%, 5% and 1% levels, respectively. The sample period covers from January 2000 to December 2021.*

Table C3. Descriptive statistics.

	$\beta^s_{i,t}$	$\beta^e_{i,t}$	$Corr_{i,t}$	$IVOL_{i,t}$
Panel A: Descriptive statistics				
Mean	0.1488	0.1055	-0.0266	0.0183
Std. Dev.	0.1755	0.1707	0.1420	0.0078
Maximum	2.1910	1.6406	0.4326	0.0475
Minimum	-0.2405	-0.3890	-0.4848	0.0045
Median	0.1142	0.0967	-0.0266	0.0168
Panel B: Correlation matrix				
$\beta^s_{i,t}$	1.0000			
$\beta^e_{i,t}$	0.7398*** (58.70)	1.0000		
$Corr_{i,t}$	0.0647*** (8.00)	0.0244** (2.06)	1.0000	
$IVOL_{i,t}$	0.0208*** (4.34)	0.0317*** (5.26)	0.0381*** (5.72)	1.0000

Note: This reports the estimates of sample summary statistics following Fama–Macbeth two-step approach. Panel A first estimates the cross-sectional mean, median, maximum, minimum and standard deviation of selected variables for each month, and then reports the time-series average of these measures. Panel B first estimates the cross-sectional correlations between variables, and then reports the time-series average of these correlations. $Rmrf_t$, Smb_t and Hml_t are Fama-French three factors over month t. $\beta^s_{i,t}$ is the sensitivity of stock excess returns to investor sentiment changes of stock i in month t. $\beta^e_{i,t}$ is the sensitivity of stock excess returns to extrapolation changes of stock i in month t. $Corr_{i,t}$ is measured as the correlation between stock monthly excess return in month t and the past 1-month excess return of the stock. $IVOL_{i,t}$ is calculated as the standard deviation of the daily residuals relative to Fama-French three factors over month t. The corresponding t statistics based on Newey-West standard errors with 5-month lags are in parentheses, $*$, $**$ and $***$ indicate significance at 10%, 5% and 1% levels, respectively. The sample period covers from January 2000 to December 2021.

Table C4. Investor sentiment, extrapolation and short-term stock return correlation: Fama–Macbeth regressions.

Variables	(1)	(2)	(3)	(4)
Intercept	-0.0021*** (-4.734)	-0.0023*** (-5.34)	-0.0052** (-2.25)	-0.0022*** (-5.29)
$\beta^s_{i,t}$		0.3149*** (14.47)		0.3081*** (14.07)
$\beta^s_{i,t-1}$		-0.3106*** (-14.38)		-0.3097*** (-14.35)
$\beta^e_{i,t}$			0.0114*** (9.43)	0.0079*** (5.05)
$Corr_{i,t-1}$	0.9482*** (427.06)	0.9505*** (423.09)	0.9488*** (416.89)	0.9511*** (432.23)
$Rmrf_t$	0.0437*** (3.94)	0.0438*** (3.72)	0.2323 (1.25)	0.0444*** (3.74)
Smb_t	0.0202* (1.87)	0.0156 (1.51)	-0.2623 (-0.94)	0.0161 (1.57)
Hml_t	0.0328** (2.40)	0.0203 (1.52)	0.0017 (0.05)	0.0205 (1.54)
No.Obs	278,841	246,503	249,089	246,503
$Avg.adj.R^2$	0.8996	0.9052	0.9011	0.9055
No. of months	226	214	215	214

Note: This table reports the Fama–Macbeth regressions of the monthly short-term stock return correlation on investor sentiment beta and extrapolation beta. In the first step, we estimate the cross-sectional statistics among selected variables for each month. Then, in the second step, we calculate the time-series average and standard deviation of cross-sectional statistics obtained in the first step, and we conduct the corresponding confidence test based on these measures. $\beta^s_{i,t}$ *is the sensitivity of stock excess returns to investor sentiment changes of stock i in month t.* $\beta^e_{i,t}$ *is the sensitivity of stock excess returns to extrapolation changes of stock i in month t.* $Corr_{i,t}$*is measured as the correlation between stock monthly excess return in month t and the past 1-month excess return of the stock.* $Corr_{i,t-1}$*is the lagged short-term stock return correlation of stock i in month t.* $Rmrf_t$, Smb_t*and* Hml_t *are Fama-French three factors over month t. The corresponding t statistics based on Newey-West standard errors with 5-month lags are in parentheses, *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively. The sample period covers from January 2000 to December 2021.*

Table C5. Sentiment beta, extrapolation beta and stock return volatility: Fama–Macbeth regressions.

Variables	(1)	(2)	(3)	(4)
Intercept	0.0100*** (64.62)	0.0096*** (51.71)	0.0097*** (52.37)	0.0097*** (51.75)
$\beta_{i,t}^{s}$		0.0012*** (7.45)		0.0005* (1.93)
$\beta_{i,t}^{e}$			0.0012*** (6.99)	0.0009*** (2.94)
$IVOL_{i,t-1}$	0.4524*** (85.29)	0.4566*** (82.59)	0.4560*** (81.67)	0.4554*** (82.92)
$Rmrf_t$	-0.0000 (-0.002)	-0.0102 (-0.97)	-0.0102 (-0.97)	-0.0103 (-0.97)
Smb_t	0.0072*** (4.49)	0.0231 (1.43)	0.0230 (1.42)	0.0231 (1.42)
Hml_t	0.0064*** (2.84)	0.0098*** (3.41)	0.0098*** (3.45)	0.0098*** (3.42)
No.Obs	503,558	250,134	250,134	250,134
$Avg.adj.R^2$	0.2240	0.2333	0.2336	0.2348
No. of months	263	215	215	215

*Note: This table reports the Fama–Macbeth regressions of the monthly stock return volatility on investor sentiment beta and extrapolation beta. $\beta_{i,t}^{s}$ is the sensitivity of stock excess returns to investor sentiment changes of stock i in month t. $\beta_{i,t}^{e}$ is the sensitivity of stock excess returns to extrapolation changes of stock i in month t. $IVOL_{i,t}$ is calculated as the standard deviation of the daily residuals relative to Fama-French three factors over month t. $IVOL_{i,t-1}$ is lagged idiosyncratic volatility of stock return stock i in month t. $Rmrf_t$, Smb_t and Hml_t are Fama and French three-factor over month t. The corresponding t statistics based on Newey-West standard errors with 5-month lags are in parentheses, *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively. The sample period covers from January 2000 to December 2021.*

Table C6. Sentiment beta, extrapolation beta and stock return volatility generated by investor sentiment : Fama–Macbeth regressions.

Variables	(1)	(2)	(3)	(4)
Intercept	0.0044*** (54.96)	0.0043*** (34.79)	0.0043*** (36.76)	0.0043*** (35.13)
$\beta^{s}_{i,t}$		0.0010*** (6.56)		0.0005*** (2.64)
$\beta^{e}_{i,t}$			0.0008*** (7.50)	0.0006*** (4.23)
$VOL^{S}_{i,t-1}$	0.1286*** (34.36)	0.1222*** (28.66)	0.1219*** (28.07)	0.1215*** (28.32)
$Rmrf_t$	-0.0038*** (-4.75)	-0.0111 (-1.54)	-0.0110 (-1.55)	-0.0110 (-1.55)
Smb_t	0.0016* (1.89)	0.0122 (1.15)	0.0122 (1.16)	0.0120 (1.15)
Hml_t	-0.0012 (-1.50)	-0.0002 (-0.12)	-0.0000 (-0.01)	-0.0001 (-0.08)
No.Obs	506,212	250,816	250,816	250,816
Avg.adj.R^2	0.0338	0.0386	0.0388	0.0402
No. of months	263	215	215	215

Note: This table reports the Fama–Macbeth regressions of the monthly stock return volatility driven by investor sentiment on sentiment beta and extrapolation beta. $\beta^{s}_{i,t}$ is the sensitivity of stock excess returns to investor sentiment changes of stock i in month t. $\beta^{e}_{i,t}$ is the sensitivity of stock excess returns to extrapolation changes of stock i in month t. $VOL^{S}{}_{i,t}$ is calculated as the standard deviation of the daily stock return driven by investor sentiment over month t. $VOL^{S}{}_{i,t-1}$ is the lagged stock return volatility driven by investor sentiment of stock i in month t. $Rmrf_t$, Smb_t and Hml_t are Fama-French three factors over month t. The corresponding t statistics based on Newey-West standard errors with 5-month lags are in parentheses, $*$, $**$ and $***$ indicate significance at 10%, 5% and 1% levels, respectively. The sample period covers from January 2000 to December 2021.