

# Internet Appendix for

## Employee Sentiment and Stock Returns

November 2021

This Internet Appendix reports the results for supplementary and robustness tests:

**Table IA 1:** Determinants of Employee Sentiment

**Table IA 2:** Additional out-of-sample results in Table 7

**Table IA 3:** Supplementary results for the asset allocation performance in Table 7

**Table IA 4:** Robust check for the extrapolation test with additional controls in Table 8

**Table IA 5:** Robust check for the cash flow forecasting in Table 8

**Table IA 6:** Supplementary results for portfolio forecasting in Table 10

**Table IA 7:** Forecasting results for size, age, and industry portfolios

**Table IA 1. Determinants of Employee Sentiment**

This table presents estimation results of the following regression,

$$S_t^{ES} = \alpha + \beta \mathbf{S}_{t-1} + \varepsilon_t,$$

where  $S_t^{ES}$  is the employee sentiment index at time  $t$ , and  $\mathbf{S}_{t-1}$  is a vector of variables that include the investor sentiment ( $S^{BW}$ ) proposed by Baker and Wurgler (2006), the manager sentiment ( $S^{MS}$ ) of Jiang, Lee, Martin, and Zhou (2019), the aligned investor sentiment index ( $S^{PLS}$ ) suggested by Huang, Jiang, Tu, and Zhou (2015), the University of Michigan consumer sentiment index ( $S^{MCSI}$ ), and the lagged market return ( $R_{t-1}$ ). The estimates of regression slopes and adjusted  $R^2$ s are reported. Also reported are Newey and West (1987)  $t$ -statistics in brackets. The sample period extends from June 2008 to December 2017.

	(1)	(2)
$S_{t-1}^{ES}$	0.74*** [13.47]	0.71*** [11.69]
$S_{t-1}^{BW}$	0.03 [0.68]	-0.02 [-0.50]
$S_{t-1}^{MS}$	0.06 [1.12]	0.07 [1.40]
$S_{t-1}^{PLS}$		-0.07 [-1.33]
$S_{t-1}^{MCSI}$		0.03 [0.53]
$R_{t-1}$	-0.07 [-1.11]	-0.09 [-1.42]
$R^2$ (%)	65.61	65.63

**Table IA 2. Out-of-sample Results for Additional Sentiment Measures**

This table reports the out-of-sample  $R_{OS}^2$ 's, *MSFE-adjusted* statistic and its  $p$ -value for predicting the monthly stock market excess return based on the aligned investor sentiment ( $S^{PLS}$ ) proposed by Huang, Jiang, Tu, and Zhou (2015) or the University of Michigan consumer sentiment index ( $S^{MCSI}$ ). Note, the measure  $S^{PLS}$  is recursively constructed out-of-sample, based on the six sentiment proxies of Baker and Wurgler (2006). This table also presents utility gains in percentage points and annualized Sharpe ratio for a mean-variance investor with a risk-aversion coefficient of 3, who allocates assets between the market portfolio and risk-free bills using the out-of-sample forecasts. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. The out-of-sample period is from June 2008 to December 2020 for  $S^{MCSI}$  and to December 2018 for  $S^{PLS}$  due to data constraints.

	$R_{OS}^2$ (%)	<i>MSFE-adjusted</i>	$p$ -value	CER gain	Sharpe Ratio
$S^{PLS}$	0.86*	1.51	0.07	-0.18	0.50
$S^{MCSI}$	-1.99	0.31	0.38	2.99	0.71

**Table IA 3. Asset Allocation Results with Transaction Costs**

This table reports the asset allocation results that include the annualized utility gains in percentage points and the annualized Sharpe ratios, after considering a proportional transaction cost of 50 basis points. While Panel A shows results for the employee sentiment  $S^{ES}$ , Panels B, C, and D report the performances for stock sentiment indices  $S^{EMI}$  and  $S^{MI}$  based on the equal-weighting, the volatility-weighting of Bates and Granger (1969), and the discount mean square prediction error (DMSPE) approach, respectively.  $S^{EMI}$  combines the employee sentiment  $S^{ES}$ , manager sentiment  $S^{MS}$ , and the investor sentiment  $S^{BW}$  together, while  $S^{MI}$  combines  $S^{MS}$  and  $S^{BW}$ . The risk-aversion coefficient is 3. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively. Except for data constrains on the combined indices (to December 2017), the out-of-sample period is from January 2013 to December 2020.

	CER gain	Sharpe Ratio
Panel A: Employee Sentiment Index		
$S^{ES}$	1.34	0.60
Panel B: Equal-weighted Stock Sentiment Index		
$S^{EMI}$	3.15	1.12
$S^{MI}$	0.79	0.98
Panel C: Volatility-weighted Stock Sentiment Index		
$S^{EMI}$	3.09	1.14
$S^{MI}$	0.03	0.97
Panel D: DMSFE Stock Sentiment Index		
$S^{EMI}$	3.14	1.14
$S^{MI}$	0.07	0.97

**Table IA 4. Extrapolation Test Results after Controlling for Investor Sentiment**

This table reports estimation results of the following regression,

$$S_t^{ES} = \alpha + \sum_{i=0}^2 \beta_i FP_{t-i} + \sum_{i=1}^2 \phi_i S_{t-i}^{ES} + \sum_{i=1}^2 \psi_i S_{t-i}^{MS} + \sum_{i=1}^2 \lambda_i S_{t-i}^{BW} + \varepsilon_t,$$

where  $S^{ES}$  is the employee sentiment index,  $FP$  represents the firm performance measures: ROE or gross profitability (GP),  $S^{MS}$  is the manager sentiment index of Jiang, Lee, Martin, and Zhou (2019), and  $S^{BW}$  is Baker and Wurgler's (2006) investor sentiment. When  $i = 0$ ,  $\beta_0$  refers to the coefficient of a contemporaneous relationship between  $S_t^{ES}$  and  $FP_t$ . All independent variables are standardized to have zero mean and unit variance. Reported are the regression slopes and adjusted  $R^2$ s in percentage form. Brackets below the slope estimates report the Newey and West (1987)  $t$ -statistics. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	ROE	GP
$\beta_0$	0.05** [1.99]	0.10* [1.79]
$\beta_1$	-0.08 [-1.32]	0.00 [0.02]
$\beta_2$	-0.02 [-0.46]	0.02 [0.43]
$\phi_1$	0.59*** [7.26]	0.59*** [7.40]
$\phi_2$	0.24*** [2.60]	0.25*** [3.10]
$\psi_1$	0.02 [0.23]	0.00 [-0.04]
$\psi_2$	0.04 [0.73]	0.03 [0.60]
$\lambda_1$	0.01 [0.04]	0.04 [0.22]
$\lambda_2$	0.07 [0.38]	0.03 [0.18]
$R^2$ (%)	65.75	66.51

**Table IA 5. Forecasting Dividend Growth**

This table presents estimation results of the following predictive regressions,

$$DG_{t+1} = \alpha + \beta S_t^{ES} + \psi \mathbf{X}_t + \varepsilon_{t+1},$$

where  $DG_{t+1}$  is aggregate log dividend growth,  $S^{ES}$  is the employee sentiment index, and  $\mathbf{X}_t$  is a vector of control variables that include the manager sentiment ( $S^{MS}$ ) of Jiang, Lee, Martin, and Zhou (2019), the investor sentiment ( $S^{BW}$ ) of Baker and Wurgler (2006), the aggregate asset growth (AG) of Cooper, Gulen, and Schill (2008), ROE, and GP. All independent variables are standardized to have zero mean and unit variance. The aggregate dividend data is from Amit Goyal's website. Reported are the regression slopes and adjusted  $R^2$ s in percentage form. Brackets below the slope estimates report the Newey and West (1987)  $t$ -statistics. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
$S^{ES}$	-0.20* [-1.72]	-0.20* [-1.73]
$S^{MS}$	0.17 [1.62]	0.17* [1.67]
$S^{BW}$	0.67*** [4.07]	0.67*** [4.08]
AG	-0.02 [-0.32]	-0.02 [-0.32]
ROE	0.02 [0.48]	0.01 [0.44]
GP		-0.03 [-1.13]
$R^2$ (%)	57.60	57.34

**Table IA 6. Forecasting Portfolio Returns after Controlling for Manager Sentiment**

This table reports forecasting results of the predictive regressions,

$$R_{t+1}^i = \alpha + \beta^i S_t^{ES} + \psi^i S_t^{BW} + \phi^i S_t^{MS} + \varepsilon_{t+1}^i,$$

where  $R_{t+1}^i$  is the monthly excess return of each one of the portfolios sorted by book-to-market (BM) ratio, return on equity (ROE), dividend payout (dividend), and earnings to price (EP) ratio;  $S^{ES}$  is the employee sentiment index,  $S^{BW}$  is the investor sentiment index of Baker and Wurgler (2006), and  $S^{MS}$  is the manager sentiment of Jiang, Lee, Martin, and Zhou (2019). All independent variables are standardized to have zero mean and unit variance. Reported are regression slopes in percentage form, Newey and West (1987)  $t$ -statistics, and the adjusted  $R^2$ 's in percentage form. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	$\beta^i$	$t$ -stat.	$\psi^i$	$t$ -stat.	$\phi^i$	$t$ -stat.	$R^2$ (%)
<u>Panel A: Book to Market Ratio (BM)</u>							
Decile1	-1.36***	-2.61	-0.80	-1.40	0.05	0.17	8.12
Decile5	-1.07**	-2.03	-0.81	-1.55	-0.05	-0.13	4.19
Decile10	-0.84	-0.86	-1.35	-1.54	-0.51	-0.65	1.40
<u>Panel B: Return on Equity (ROE)</u>							
Decile1	-1.74**	-2.35	-1.07*	-1.66	-0.28	-0.53	8.66
Decile5	-1.31**	-2.14	-0.80*	-1.73	-0.08	-0.17	5.31
Decile10	-1.33**	-2.54	-0.84	-1.42	0.02	0.07	8.37
<u>Panel C: Dividend Payout (Dividend)</u>							
Decile1	-1.73**	-2.03	-0.98	-1.17	-0.16	-0.42	7.90
Decile5	-1.61**	-2.38	-0.91	-1.39	0.08	0.23	7.14
Decile10	-1.30**	-2.05	-0.52	-0.88	-0.70	-0.95	5.22
<u>Panel D: Earnings Price Ratio (EP)</u>							
Decile1	-1.58**	-2.22	-1.10	-1.62	-0.17	-0.53	10.10
Decile5	-1.32**	-2.46	-0.73	-1.54	0.20	0.59	6.18
Decile10	-1.33*	-1.94	-1.02	-1.40	-0.01	-0.03	4.79

**Table IA 7. Forecasting Other Characteristic Portfolios**

This table reports forecasting results of the predictive regressions,

$$R_{t+1}^i = \alpha + \beta^i S_t^{ES} + \psi^i S_t^{BW} + \phi^i S_t^{MS} + \varepsilon_{t+1}^i,$$

where  $R_{t+1}^i$  is the monthly excess return of each one of the 10 size portfolios, 10 age portfolios, and 10 industry portfolios given in the first column;  $S^{ES}$  is the employee sentiment index,  $S^{BW}$  is the investor sentiment index of Baker and Wurgler (2006), and  $S^{MS}$  is the manager sentiment of Jiang, Lee, Martin, and Zhou (2019). All independent variables are standardized to have zero mean and unit variance. Reported are regression slopes in percentage form, Newey and West (1987)  $t$ -statistics, and the adjusted  $R^2$ 's in percentage form. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	$\beta^i$	$t$ -stat.	$\psi^i$	$t$ -stat.	$\phi^i$	$t$ -stat.	$R^2$ (%)
<u>Panel A: Size Portfolios</u>							
Decile1	-1.52**	-2.26	-1.51**	-2.14	0.19	0.40	7.29
Decile5	-1.52**	-2.29	-1.32**	-2.13	0.14	0.34	6.49
Decile10	-1.23***	-2.61	-0.67	-1.33	-0.06	-0.21	7.83
<u>Panel B: Age Portfolios</u>							
Decile1	-1.71**	-2.08	-1.21	-1.62	0.16	0.35	7.65
Decile5	-1.46**	-2.24	-1.25*	-1.84	-0.01	-0.05	8.67
Decile10	-1.34***	-2.75	-0.91*	-1.83	0.09	0.29	8.88
<u>Panel C: Industry Portfolios</u>							
NonDurables	-1.20*	-1.79	-1.61**	-2.06	-0.11	-0.19	8.02
Durables	-1.54*	-1.68	-2.31**	-2.14	-0.65	-0.85	9.29
Manufacturing	-1.95**	-2.33	-2.01**	-2.42	0.04	0.07	9.99
Energy	-3.16**	-2.45	-3.03***	-2.61	0.49	0.51	9.71
HiTec	-1.46*	-1.87	-2.06**	-2.35	0.08	0.17	11.38
Telcm	-1.86**	-2.31	-2.19**	-2.29	-0.04	-0.08	11.74
Shops	-1.31*	-1.68	-2.07**	-2.26	0.48	1.04	7.62
Hlth	-1.11	-1.48	-1.86*	-1.80	0.49	1.09	4.42
Utilities	-1.09***	-2.73	-0.58*	-1.77	0.01	0.05	7.05
Other	-0.92	-1.50	-0.99*	-1.83	0.17	0.39	2.18