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More noise or more information?**

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Differences Between NZ and U.S. Individual Investor Sentiment: More Noise or More Information?

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Abstract: In this study, we introduce a newly created sentiment index of individual investors in NZ constructed similar to the well-known sentiment index provided by the American Association of Individual Investors (AAII) in the U.S. This unique setup allows us to compare different aspects of investors' behaviour in both countries. We show that NZ market participants are less confident about the directional movement of the stock market, their expectations are more volatile and their distributions have fatter tails. By contrast, both bullish and bearish sentiment is more persistent among U.S. investors. Furthermore, our analysis of return predictability reveals that both groups of investors behave as noise traders. However, the results for NZ investors are stronger. Overall, our findings call for better financial education, particularly in the area of equity investing.

JEL Classification: G11, G14, G18

Keywords: AAII sentiment index, Information traders, Noise traders, NZ sentiment index, Return predictability

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1. Introduction

Prior research has documented that investor sentiment plays an important role in equity markets. The majority of the literature reports strong evidence that investor sentiment negatively predicts stock returns (e.g., Baker and Wurgler, 2006; Baker, Wurgler, and Yuan, 2012; Jiang et al., 2019). Such negative predictability can be explained by the concept of noise trading, which suggests there are essentially two types of traders present in the market: rational information traders and those that trade on noise as if it was information (e.g., Black, 1986; DeLong, Shleifer, Summers, and Waldmann, 1990; Kumar and Lee, 2006; Aabo, Pantzalis, and Park, 2017). If uninformed noise traders make trading decisions based on their sentiment, and risk-averse information traders encounter limits to arbitrage, sentiment changes leads to more noise trading and greater mispricing (DeLong, Shleifer, Summers, and Waldmann, 1990). The sentiment-driven mispricing of stocks is subsequently corrected by information traders, which results in a negative relationship between investor sentiment and future stock returns. Several studies test the implications of noise trading models by analysing activities of individual investors (e.g., Kumar and Lee, 2006; Kaniel, Saar, and Titman, 2008; Foucault, Sraer, and Thesmar, 2011). In summary, individual investors are more likely to behave as noise traders, since they tend to buy and sell stocks in concert with each other and their trading increases the volatility of stock returns, which is consistent with theoretical predictions.

Two main approaches have been proposed to capture investors' sentiment: measures based on market variables and survey-based measures.¹ The former builds on variables such as the put-call parity, the CBOE VIX index (also called fear index), closed-end fund discounts, mutual fund flows, IPO returns and IPO volume to construct a measure of sentiment. Market-based proxies capture sentiment of both individual and institutional investors and may reflect

¹ Textual analysis of media contents such news articles, blogs or Google searches is another approach to measure investor sentiment, but is largely limited to key words.

macroeconomic fundamentals that are unrelated to sentiment.² By contrast, survey-based approaches provide a more direct (from the source) estimate of individual investors' sentiment.³ A well-known example is the American Association of Individual Investors (AAII) sentiment index, which has been widely used in the academic literature and by practitioners alike (e.g., Brown, 1999; Fisher and Statman, 2006; Kurov, 2008; Jacobs, 2015; Gu, Chen, and Stan, 2021).⁴ However, it has not been fully explained yet whether individual investors are irrational noise traders to the extent that their sentiment negatively predicts stock returns (Verma and Verma, 2008).⁵ If most of them are, as conjectured in the literature, their sentiment is expected to negatively predict stock returns. On the contrary, if they are mostly information traders, who recognise the prevailing mispricing and trade against it, then their sentiment should have positive predictability for stock returns. Alternatively, if the surveyed investors consist almost equally of noise traders and information traders, sentiment might manifest no predictability. In other words, the more noise (information) traders are surveyed, the stronger should be the negative (positive) return predictability.

In this paper, we extend the literature on (mainly U.S.) investor sentiment by investigating whether individual investors in New Zealand (NZ) behave similar to those in the U.S. More specifically, we construct a sentiment index of individual investors with a similar approach to the AAI sentiment index in the U.S., which allows us to compare various aspects of investors' behaviour in both countries. This is important, since individual investors may play different roles in the financial markets of different countries. For example, many stocks in the

² For example, see Brown and Cliff (2004), Qui and Welch (2006), Baker and Wurgler (2007) and Da et al. (2015).

³ Of course, surveys depend on response rates and truthful answers from participants, and are usually not available in high frequency.

⁴ Other commonly cited surveys are the Investors Intelligence Sentiment Report, the University of Michigan Consumer Sentiment Index and the UBS/GALLUP Investor Optimism Index. All these indices focus on the U.S., and the latter also on European markets.

⁵ Verma and Verma (2008) find that general risk factors affect sentiment, but the effect is stronger for institutional than for individual investors. In addition, Kaniel, Saar, and Titman (2008) find that trades of individual investors on the NYSE positively predict stock returns.

NZX 50 index lack institutional backing, thus the NZ market provides an interesting setting to test the effect of sentiment. We show that NZ market participants are less confident about the directional movement of the stock market, their expectations are more volatile and their distributions have fatter tails - extreme levels of sentiment are more frequent. By contrast, both bullish and bearish sentiment are more persistent among U.S. investors, whereas neutral sentiment is more persistent among NZ investors. Furthermore, we investigate the return predictability of both the NZ and the AAIL sentiment index. Our findings reveal that, consistent with the literature, both sentiment indices are negatively correlated with future stock returns, implying that both groups of individual investors surveyed behave as noise traders. Interestingly, we find that the negative predictability of the NZ sentiment index is stronger compared to the U.S. one, which suggests that there are likely more noise traders present among investors in New Zealand.

2. Data

2.1 The NZ sentiment index and other data

The NZ sentiment index is constructed from a representative and carefully sampled survey of individual investors in New Zealand. Since January 2020, we have asked all registered members of the New Zealand Shareholder Association (NZSA) on a weekly basis whether they expect the stock market to increase (bullish), decrease (bearish) or stay the same (neutral) over the next six months. We have asked the question twice, separately for the NZ and the U.S. stock market. The survey is conducted from Thursday 12:01 am until Wednesday 11:45 pm. NZSA members receive an email invitation to participate in the survey, with reminders sent on Monday to those who have not started or completed the survey. Each Thursday morning, we

prepare the results including commentary, which are then published online.⁶ The NZSA has about 1,400 members, a quarter of which receives email invitations to participate in the survey. The response rate varies between 40% and 50%. Our approach closely follows the commonly cited sentiment survey compiled by the AAI to ensure data quality and to facilitate comparison. Since July 1987, the AAI has been conducting its weekly survey whereby participants are asked the same question about their market short-term outlook as outlined above. The AAI does not track long-term response rates, but it varies between 100 and 350 participants out of a pool of more than 160,000 members (for more details see Rotblut, 2013 or Brown and Cliff, 2004). The time series data is available directly from the AAI. One caveat is that we do not have detailed information about the respondents' economic and demographic characteristics of either of the surveys.⁷ Another word of caution is that both surveys allow members to participate 'whenever they feel like it' and thus a degree of self-selection bias is present.

In addition, we employ the NZX 50 index and S&P 500 index as the stock market indices for NZ and the U.S. respectively. Our sample period runs from January 2020 to December 2021.⁸ Following previous studies (e.g., Bollerslev, Tauchen, and Zhou, 2009; Jiang et al., 2019), we include economic variables in the predictive regressions using sentiment to control for the information associated with macroeconomic fundamentals and business cycles. The standard economic variables used are the earnings-price ratio (EP), defined as the ratio of earnings on the stock market index to the index price; dividend-payout ratio (DE), defined as

⁶ The results can be accessed via NZSA's website <[NZ Retail Investor Sentiment Index - New Zealand Shareholders' Association \(nzshareholders.co.nz\)](https://nzshareholders.co.nz)>.

⁷ Based on a survey conducted by the NZSA in 2021, the majority of its members (85%) is 60 years or older, have several years of investment experience and about 60% have a portfolio of over NZ\$500,000. According to information from the AAI, their typical member is male, in their 60s with a graduate or post-graduate degree and a median investment portfolio size of over US\$1 million (see Rotblut, 2013).

⁸ For the predictive regressions over 12- and 24-week horizons, we use the returns on the NZX 50 and the S&P 500 index up to the end of June 2022.

the ratio of dividends over the earnings on the stock market index; dividend yield (DY), defined as the index dividends divided by the lagged index price; the three-month Treasury bill rate (TBL); the long-term government bond yield (LTY) as the yield on 10-year government bonds for the NZ market as well as the yield on the long-term United States Bonds Series available from NBER's Macroeconomic history database for the U.S. market; the term spread (TMS) calculated as the long-term yield minus the Treasury bill rate, and default yield spread (DFY) defined as the difference between BAA- and AAA-rated bond yields. The information on the market indices is collected from Bloomberg.

2.2 Comparison of the NZ and the U.S. sentiment index

Table 1 reports descriptive statistics of the NZ and the AAI sentiment index as well as weekly returns on the NZX 50 and the S&P 500 index. Both bullish and bearish sentiment among individual investors in NZ is lower on average compared to those in the U.S., while neutral sentiment tends to be higher. Although investors in NZ appear to be less confident about the direction the stock market will take over the short term, the standard deviation is higher, so their views are more volatile with larger low and high levels of sentiment. The higher skewness and kurtosis suggest a heavy-tailed distribution.

[Insert Table 1 about here]

The autocorrelation plots shown in Figures 1 and 2 suggest some degree of persistence in the time series behaviour of investor sentiment. In other words, when investors are bullish (bearish or neutral) in one week, they tend to remain bullish (bearish or neutral) in the following week. The autocorrelation of bullish and bearish sentiment appears to be slightly larger for U.S. investors, whereas neutral sentiment tends to be more persistent among NZ investors. Figure

A.1 in the appendix shows the time series graphs of bullish, neutral and bearish sentiment of NZ versus U.S. investors.

[Insert Figure 1 about here]

[Insert Figure 2 about here]

Table 2 reports pairwise correlations between the NZ and the U.S. sentiment measures. The correlation is strongest between bearish sentiment (0.646), followed by neutral (0.480) and then bullish sentiment (0.382). All coefficients are statistically significant at the one percent level.

[Insert Table 2 about here]

3. Empirical methodology and results

In this paper, we analyse whether investor sentiment is related to future stock returns over short- and medium-term horizons. Earlier findings in the literature document a strong negative predictability (e.g. Baker and Wurgler, 2006; Baker, Wurgler, and Yuan, 2012; Jiang et al., 2019), which can be explained by the theoretical models of noise trading (e.g., Black, 1986; DeLong, Shleifer, Summers, and Waldmann, 1990; Kumar and Lee, 2006; Aabo, Pantzalis, and Park, 2017). We contribute to the debate analysing a newly created sentiment index of individual investors in NZ, in addition to the commonly cited AAI sentiment index of investors in the U.S. We fit the following general predictive regression model:

$$Ret_{m_{t+k}} = \alpha + \beta_1 Sent_t + \beta_2 Z_t + \varepsilon_{i,t} ,$$

where $Ret_{m_{t+k}}$ denotes the average weekly return of the k -week future returns on the NZX 50 index and the S&P 500 index respectively. $Sent_t$ is the value of either the NZ or the AAI

sentiment measures, and Z_t is a vector of control variables that are known to be related with stock returns. We include the earnings-price ratio (EP), the dividend-payout ratio (DE), the dividend yield (DY), the three-month Treasury bill rate (TBL), the long-term yield (LTY), the term spread (TMS) and the default yield spread (DFY) for the respective market index. Considering the multicollinearity of the control variables, the model specifications include just one variable at a time.⁹ To account for problems caused by overlapping observations, we follow Bollerslev et al. (2015) and use Newey-West standard errors with lag length twice the forecast horizons.

Table 3 and Table 4 report results of the predictive regressions over a 12-week and 24-week horizon, respectively, using the NZ sentiment index.¹⁰ The coefficient estimates on bullish sentiment are negative although not always significant. The coefficients on bearish sentiment are positive and significant with and without control variables. Correspondingly, market returns are negatively related to the spread between bullish and bearish sentiment, which is largely driven by the investors' pessimistic views. The stronger predictive ability of bearish sentiment is consistent with findings in the behavioural literature on loss aversion individual investors are prone to (e.g. see Kahneman and Tversky, 1979 and 1984; Tversky and Kahneman, 1991). That is, investors dislike losses asymmetrically more than they enjoy equivalent gains. The coefficient estimates are smaller in magnitude for the 24-week period, but have similar t -statistics as for the 12-week period.¹¹ Based on the more conservative estimates in Table 4, a one-standard-deviation change in the NZ sentiment index (bull-bear

⁹ As an alternative approach, we also fit a Lasso regression. The sentiment measures bullish, bearish and bull-bear spread are always selected in addition to the economic variables using either the cross-validation (CV), the minimum Bayes information criterion (minBIC) or the adaptive model selection methods. We would like to thank an anonymous reviewer for suggesting this approach.

¹⁰ We also estimate the regressions over 1-, 3- and 6-week horizons. The untabulated results show that the sentiment index does not manifest any predictability for relatively short forecast horizons (less than three and six weeks for NZ and the U.S. respectively), which is consistent with the existing literature (e.g., Bollerslev, Tauchen, and Zhou, 2009; Bollerslev et al., 2015).

¹¹ Including sentiment in addition to the economic variables improves the model fit and results in lower prediction errors for all k -week return forecast specifications.

spread) is associated with a change in the NZX 50 index of about -3.46% over the 24-week horizon,¹² and thus is not only statistically significant but also economically meaningful.

[Insert Table 3 about here]

[Insert Table 4 about here]

Table 5 and Table 6 report results of the same analysis using the AAI sentiment index. As before, future market returns are negatively (positively) related to bullish (bearish) sentiment. However, the results are only marginally significant (for bearish sentiment). Overall, our results are consistent with prior literature documenting a negative relationship between sentiment measures and subsequent market returns. Interestingly, the predictive power of the NZ sentiment index is much stronger than of the AAI index, suggesting NZ individual investors surveyed behave somewhat more like noise traders than their U.S. counterparts. Since constructing both indices is based on the same approach, this is likely due to differences in the population of respondents and their level of financial sophistication.¹³

[Insert Table 5 about here]

[Insert Table 6 about here]

Table 7 and 8 report results using NZ investor sentiment about the stock market in the U.S. Again, subsequent market returns are negatively related to sentiment, with a stronger relation for the longer horizon. The association between returns and sentiment is similarly strong as for the domestic market.

¹² The effect is calculated using the standard deviation of the bull-bear spread reported in Table 1 and the coefficient estimate in column 1 of Table 4 Panel C.

¹³ Since we do not have access to information about the economic and demographic characteristics of the survey participants, we are unable to elaborate on this.

[Insert Table 7 about here]

[Insert Table 8 about here]

4. Conclusion

This paper contributes to the literature about investor sentiment affecting market returns. We introduce a newly created sentiment index of individual investors in NZ, which allows the comparison of findings based on the commonly cited AAI sentiment index in the U.S. While market participants in NZ display less conviction about the short-term direction of the stock market, their expectations vary more and have fatter tails, meaning high levels of optimism (exuberance) or pessimism (gloom) may occur more often. Bullish and bearish sentiment, correspondingly, tends to be less persistent in NZ compared to the U.S. Consistent with prior literature, we also find that both NZ and AAI sentiment indices negatively predict market returns. The negative association, however, is stronger for the NZ sentiment index. One possible explanation for the difference is that there might be more noise traders among NZ individual investors, which, as we show, exhibit more attributes of noise traders than those in the U.S. Improving financial literacy may help mitigate the effect of biased opinions on price discovery through the interaction of (more) informed buyers and sellers and plays an important role for further market development. For example, including fundamentals of equity markets and valuation in secondary and tertiary curricula, supporting capital market research, promoting public awareness campaigns and establishing collaborations between public and professional bodies to provide educational initiatives and resources creates an environment that enhances financial literacy. Our sentiment index contributes to such an environment by providing additional evidence of individual investor behaviour in general and new market data for further research in particular.

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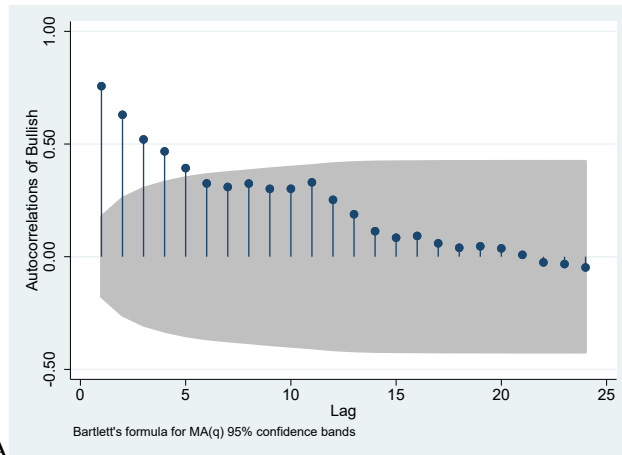
Tversky, Amos, and Daniel Kahneman. 1991. "Loss Aversion and Riskless Choice: A Reference Dependent Model," *Quarterly Journal of Economics* 106 (4):1039-1061.

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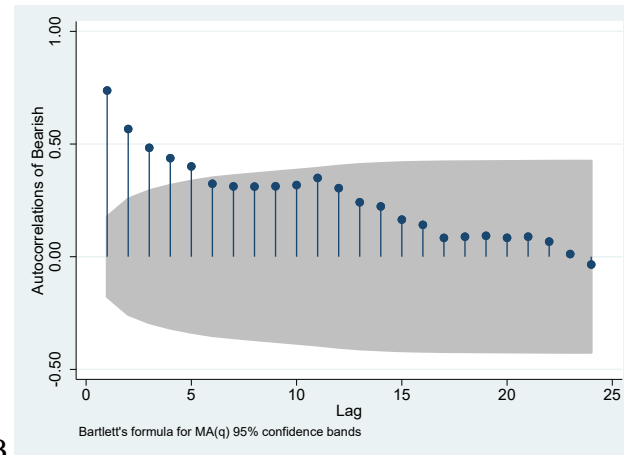
Washer, Kenneth M, Robert R Johnson, and Gerald R Jensen. 2018. "Insights from the American Association of Individual Investors Asset Allocation Survey." *Journal of Financial Service Professionals* 72 (5).

Figure 1
NZ sentiment autocorrelation plots

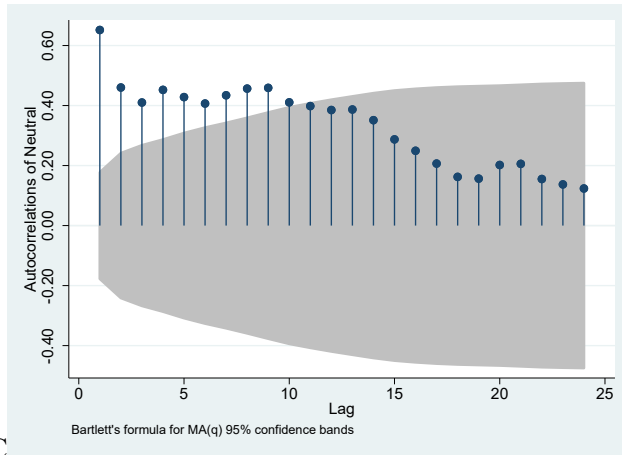
This figure presents autocorrelation graphs of NZ investor sentiment measures. Panels A, B, C and D show the autocorrelations for bullish, bearish, neutral and bull-bear spread, respectively. The grey shaded area indicates Bartlett's formula for MA(q) 95% confidence bands. The sample period is January 2020 to December 2021.



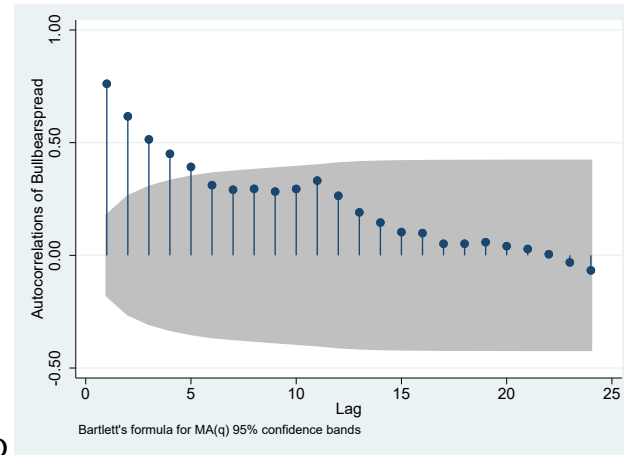
Panel A



Panel B



Panel C

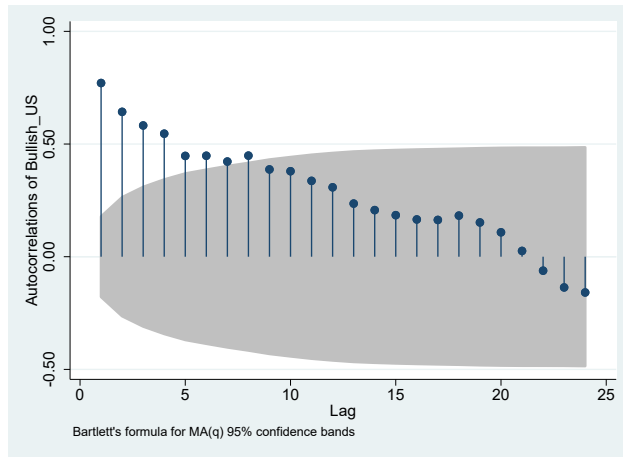


Panel D

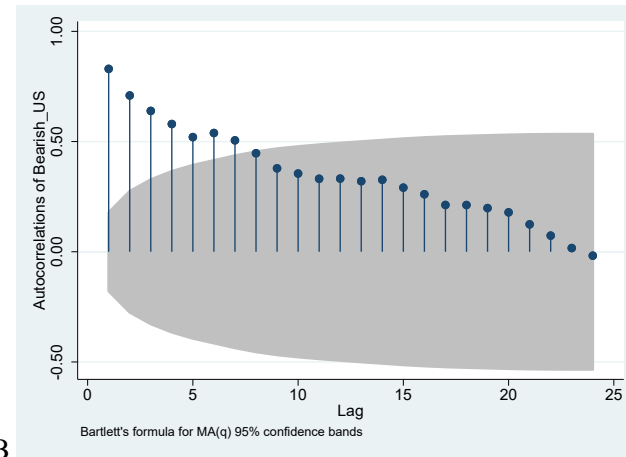
Figure 2

AAII sentiment autocorrelation plots

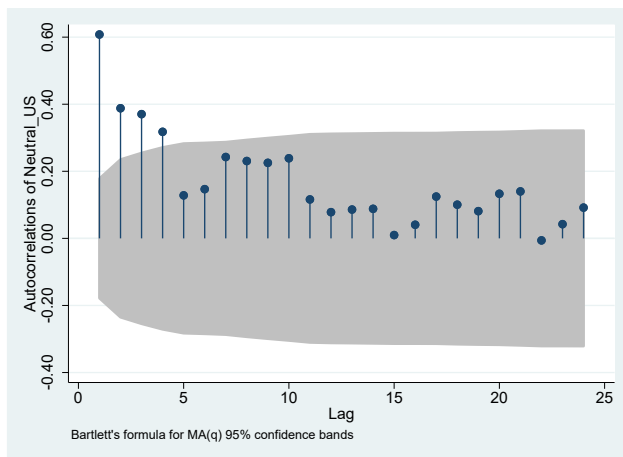
This figure presents autocorrelation graphs of U.S. investor sentiment measures. Panels A, B, C and D show the autocorrelations for bullish, bearish, neutral and bull-bear spread, respectively. The grey shaded area indicates Bartlett's formula for MA(q) 95% confidence bands. The sample period is January 2020 to December 2021.



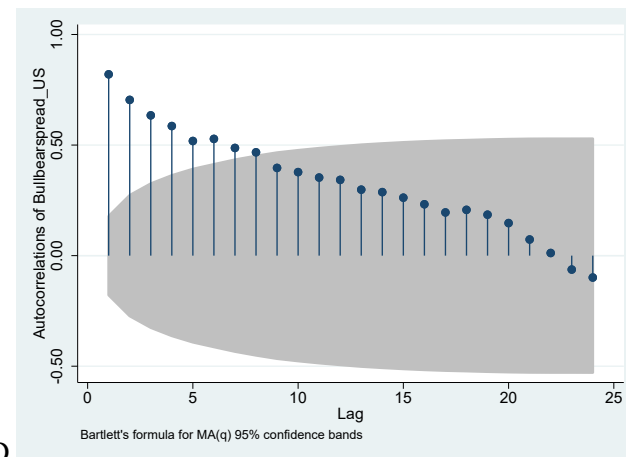
Panel A



Panel B



Panel C



Panel D

Table 1
Summary statistics of sentiment data

This table reports weekly summary statistics of the NZ and the AAI sentiment indices as well as returns on the NZX 50 index and the S&P 500 index. The sample period is January 2020 to December 2021.

	Description	Obs.	Mean	Std	Min	Max	P10	Median	P90	Skewness	Kurtosis
Bullish ^{NZ}	NZ individual bullish sentiment	120	0.3004	0.1225	0.1250	0.7037	0.1835	0.2746	0.4627	1.2674	4.4395
Neutral ^{NZ}	NZ individual neutral sentiment	120	0.3502	0.0970	0.1250	0.5957	0.2302	0.3462	0.4757	0.1533	2.6933
Bearish ^{NZ}	NZ individual bearish sentiment	120	0.3494	0.1361	0.0694	0.6786	0.1711	0.3667	0.5000	0.0725	2.3898
Bullbearsread ^{NZ}	NZ bull-bear spread	120	-0.0490	0.2402	-0.4822	0.6250	-0.3545	-0.0972	0.2341	0.6045	3.0464
Bullish ^{US}	AAII individual bullish sentiment	120	0.349	0.092	0.158	0.569	0.234	0.346	0.472	0.159	2.333
Neutral ^{US}	AAII individual neutral sentiment	120	0.295	0.054	0.145	0.406	0.230	0.295	0.369	-0.228	3.087
Bearish ^{US}	AAII individual bearish sentiment	120	0.356	0.098	0.198	0.594	0.236	0.354	0.494	0.227	1.913
Bullbearsread ^{US}	AAII bull-bear bearish spread	120	-0.008	0.182	-0.429	0.365	-0.249	-0.009	0.224	-0.015	1.952
R _m ^{NZ} (in %)	Weekly log return of NZX50 index	120	0.000	0.022	-0.140	0.069	-0.022	0.001	0.023	-1.932	15.867
R _m ^{US} (in %)	Weekly log return of S&P 500	120	0.002	0.032	-0.198	0.099	-0.031	0.006	0.028	-2.221	16.811

Table 2**Correlations between sentiment measures**

This table reports pairwise correlations between the NZ and the AAI sentiment measures (bullish, bearish, neutral and bull-bear spread). ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Bullish ^{NZ}	Neutral ^{NZ}	Bearish ^{NZ}	Bullbear-spread ^{NZ}	Bullish ^{US}	Neutral ^{US}	Bearish ^{US}	Bullbear-spread ^{US}
Bullish ^{NZ}	1.000							
Neutral ^{NZ}	-0.307***	1.000						
Bearish ^{NZ}	-0.705***	-0.459***	1.000					
Bullbearsread ^{NZ}	0.918***	0.096	-0.929***	1.000				
Bullish ^{US}	0.382***	0.297***	-0.580***	0.526***	1.000			
Neutral ^{US}	-0.152	0.480***	-0.219**	0.043	-0.139	1.000		
Bearish ^{US}	-0.259***	-0.542***	0.650***	-0.500***	-0.825***	-0.445***	1.000	
Bullbearsread ^{US}	0.332***	0.445***	-0.646***	0.536***	0.951***	0.175*	-0.960***	1.000

Table 3**NZ investor sentiment and the NZX50 index: 12-week forecast horizon**

This table reports estimation results for predictive regressions of market returns on investor sentiment for the New Zealand market. The dependent variable is the average weekly return on the NZX 50 index over $k = 12$ week forecast horizons. The variables of interest in Panel A, B and C are the bullish ($Bullish^{NZ}$), bearish ($Bearish^{NZ}$) and bull-bear spread ($Bullbearsread^{NZ}$) investor sentiment measures, respectively. Classic economic control variables include the earnings-price ratio EP^{NZ} , the dividend-payout ratio DE^{NZ} , the dividend-price ratio DY^{NZ} , Treasury bill rate TBL^{NZ} , long-term yield LTY^{NZ} , term spread TMS^{NZ} , and default yield spread DFY^{NZ} of NZX 50 index. In the table, t -statistics are based on Newey-West corrected standard errors with 24 lags (reported in brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level. The sample period is January 2020 to December 2021.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullish ^{NZ}	-0.013 (-1.52)	-0.021*** (-5.53)	-0.019*** (-3.54)	-0.013 (-1.48)	-0.014** (-2.33)	-0.022*** (-6.77)	-0.018*** (-3.91)	-0.019*** (-4.21)
Econ		-0.191** (-2.51)	0.007*** (2.89)	1.311 (0.59)	-0.012*** (-5.99)	-0.006*** (-6.88)	-0.004 (-1.36)	-0.004 (-1.46)
Constant	0.005 (1.43)	0.014*** (5.91)	0.001 (0.17)	0.005 (1.32)	0.011*** (6.98)	0.016*** (12.14)	0.010*** (3.77)	0.015*** (2.89)
Econ variable	None	EP ^{nz}	DE ^{nz}	DY ^{nz}	TBL ^{nz}	LTY ^{nz}	TMS ^{nz}	DFY ^{nz}
Adj. R2	0.0788	0.2246	0.2357	0.0709	0.4822	0.4431	0.1659	0.2060

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bearish ^{NZ}	0.019** (2.36)	0.023*** (2.84)	0.018** (2.33)	0.019** (2.20)	0.021*** (4.28)	0.017*** (2.67)	0.018** (2.02)	0.024*** (4.39)
Econ		-0.166** (-2.29)	0.005 (1.65)	-0.899 (-0.32)	-0.013*** (-8.06)	-0.004*** (-3.71)	-0.001 (-0.42)	-0.005** (-2.46)
Constant	-0.005** (-2.02)	-0.001 (-0.45)	-0.009** (-2.09)	-0.005* (-1.98)	0.000 (0.15)	0.001 (0.46)	-0.004 (-0.68)	0.002 (0.54)
Econ variable	None	EP ^{nz}	DE ^{nz}	DY ^{nz}	TBL ^{nz}	LTY ^{nz}	TMS ^{nz}	DFY ^{nz}
Adj. R2	0.1902	0.3132	0.2595	0.1826	0.6320	0.3832	0.1978	0.3568

Panel C	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullbearsread ^{NZ}	-0.010** (-2.05)	-0.013*** (-4.30)	-0.011*** (-2.90)	-0.010* (-1.93)	-0.010*** (-3.80)	-0.011*** (-4.35)	-0.010*** (-2.71)	-0.013*** (-7.11)
Econ		-0.194*** (-2.81)	0.006** (2.20)	-0.201 (-0.07)	-0.013*** (-6.26)	-0.005*** (-4.71)	-0.003 (-0.88)	-0.005* (-1.96)
Constant	0.001 (0.75)	0.007*** (3.88)	-0.005 (-1.44)	0.001 (0.68)	0.007*** (7.31)	0.008*** (7.92)	0.003 (1.14)	0.010** (2.50)
Econ variable	None	EP ^{nz}	DE ^{nz}	DY ^{nz}	TBL ^{nz}	LTY ^{nz}	TMS ^{nz}	DFY ^{nz}
Adj. R2	0.1553	0.3149	0.2734	0.1468	0.5799	0.4347	0.1999	0.3237

Table 4

NZ investor sentiment and the NZX50 index: 24-week forecast horizon

This table reports estimation results for predictive regressions of market returns on investor sentiment for the New Zealand market. The dependent variable is the average weekly return on the NZX 50 index over $k = 24$ week forecast horizons. The variables of interest in Panel A, B and C are the bullish ($Bullish^{NZ}$), bearish ($Bearish^{NZ}$) and bull-bear spread ($Bullbearsread^{NZ}$) investor sentiment measures, respectively. Classic economic control variables include the earnings-price ratio EP^{NZ} , the dividend-payout ratio DE^{NZ} , the dividend-price ratio DY^{NZ} , Treasury bill rate TBL^{NZ} , long-term yield LTY^{NZ} , term spread TMS^{NZ} , and default yield spread DFY^{NZ} of NZX 50 index. In the table, t -statistics are based on Newey-West corrected standard errors with 48 lags (reported in brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level. The sample period is January 2020 to December 2021.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullish ^{NZ}	-0.005 (-0.74)	-0.009** (-2.30)	-0.009** (-2.54)	-0.005 (-0.74)	-0.005 (-0.70)	-0.009*** (-2.92)	-0.009** (-2.36)	-0.006 (-1.29)
Econ		-0.109 (-1.49)	0.006*** (3.22)	-0.614 (-0.50)	-0.004* (-1.73)	-0.004*** (-3.49)	-0.003*** (-2.86)	-0.001 (-0.49)
Constant	0.003 (0.83)	0.007*** (5.07)	-0.001 (-0.39)	0.003 (0.83)	0.004* (1.88)	0.009*** (7.68)	0.007*** (4.11)	0.005* (1.90)
Econ variable	None	EP ^{nz}	DE ^{nz}	DY ^{nz}	TBL ^{nz}	LTY ^{nz}	TMS ^{nz}	DFY ^{nz}
Adj. R2	0.0255	0.1504	0.2968	0.0161	0.1288	0.4088	0.2548	0.0401

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bearish ^{NZ}	0.013*** (2.95)	0.015*** (4.52)	0.012*** (2.76)	0.014*** (2.79)	0.013*** (3.86)	0.011*** (2.75)	0.012** (2.32)	0.015*** (5.92)
Econ		-0.110* (-1.82)	0.004** (2.11)	-2.867* (-1.73)	-0.004 (-1.61)	-0.003** (-2.09)	-0.002 (-1.37)	-0.002 (-0.82)
Constant	-0.003*** (-3.87)	-0.000 (-0.19)	-0.007*** (-4.04)	-0.003*** (-3.54)	-0.001 (-1.02)	0.001 (0.55)	-0.001 (-0.39)	-0.000 (-0.03)
Econ variable	None	EP ^{nz}	DE ^{nz}	DY ^{nz}	TBL ^{nz}	LTY ^{nz}	TMS ^{nz}	DFY ^{nz}
Adj. R2	0.2700	0.4148	0.4310	0.2807	0.3871	0.4800	0.3540	0.3256

Panel C	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullbearsread ^{NZ}	-0.006* (-1.82)	-0.008*** (-4.76)	-0.006*** (-3.13)	-0.006* (-1.78)	-0.006** (-2.04)	-0.006*** (-3.31)	-0.006** (-2.50)	-0.007*** (-3.92)
Econ		-0.121* (-1.74)	0.005*** (2.63)	-1.945 (-1.30)	-0.004 (-1.50)	-0.004*** (-2.72)	-0.003** (-2.11)	-0.002 (-0.67)
Constant	0.001 (1.06)	0.005*** (3.16)	-0.004* (-1.66)	0.001 (1.12)	0.003*** (4.74)	0.006*** (3.58)	0.004*** (4.36)	0.004 (1.18)
Econ variable	None	EP ^{nz}	DE ^{nz}	DY ^{nz}	TBL ^{nz}	LTY ^{nz}	TMS ^{nz}	DFY ^{nz}
Adj. R2	0.1475	0.3123	0.3847	0.1471	0.2533	0.4626	0.3188	0.1891

Table 5

U.S. investor sentiment and the S&P 500 index: 12-week forecast horizon

This table reports estimation results for predictive regressions of market returns on investor sentiment for the U.S. market. The dependent variable is the average weekly return on the S&P500 index over $k = 12$ week forecast horizons. The variables of interest in Panel A, B and C are the bullish ($Bullish^{US}$), bearish ($Bearish^{US}$) and bull-bear spread ($Bullbearsread^{US}$) investor sentiment measures, respectively. Classic economic control variables include the earnings-price ratio EP^{US} , the dividend-payout ratio DE^{US} , the dividend-price ratio DY^{US} , Treasury bill rate TBL^{US} , long-term yield LTY^{US} , term spread TMS^{US} , and default yield spread DFY^{US} of S&P500 index. In the table, t -statistics are based on Newey-West corrected standard errors with 24 lags (reported in brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level. The sample period is January 2020 to December 2021.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullish ^{US}	-0.010 (-0.85)	-0.008 (-0.72)	-0.011 (-0.95)	-0.009 (-0.81)	-0.012 (-1.41)	0.018* (1.93)	-0.016 (-0.74)	-0.006 (-0.73)
Econ		0.060 (0.26)	0.657 (1.33)	22.180* (1.72)	-0.010*** (-5.92)	-0.012** (-2.40)	0.002 (0.46)	0.002 (0.71)
Constant	0.008* (1.72)	0.004 (0.41)	0.007 (1.42)	0.006 (1.38)	0.011** (2.41)	0.011*** (2.75)	0.008 (1.54)	0.004 (0.87)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.0049	-0.0024	-0.0001	0.0039	0.3905	0.3471	0.0151	0.0130

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bearish ^{US}	0.028* (1.73)	0.042* (1.71)	0.029* (1.79)	0.028 (1.64)	0.031** (2.51)	-0.004 (-0.32)	0.049* (1.74)	0.029* (1.69)
Econ		-0.276 (-0.95)	0.826 (1.65)	7.894 (0.49)	-0.010*** (-7.96)	-0.011** (-2.34)	0.006 (1.18)	-0.000 (-0.16)
Constant	-0.006 (-0.85)	0.001 (0.06)	-0.007 (-1.10)	-0.006 (-0.95)	-0.004 (-0.96)	0.017** (2.62)	-0.019 (-1.28)	-0.006 (-0.80)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.1346	0.1693	0.1341	0.1269	0.5404	0.3124	0.2681	0.1264

Panel C	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullbearsread ^{US}	-0.011 (-1.34)	-0.013 (-1.38)	-0.011 (-1.41)	-0.011 (-1.28)	-0.012* (-1.96)	0.006 (1.28)	-0.018 (-1.18)	-0.010 (-1.41)
Econ		-0.088 (-0.34)	0.778 (1.58)	15.255 (1.10)	-0.010*** (-6.81)	-0.012** (-2.45)	0.004 (0.78)	0.001 (0.33)
Constant	0.004*** (3.06)	0.008 (0.76)	0.003 (1.64)	0.003** (2.23)	0.006*** (4.20)	0.017*** (3.53)	0.000 (0.08)	0.003 (0.84)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.0629	0.0584	0.0606	0.0576	0.4598	0.3264	0.1231	0.0564

Table 6

U.S. investor sentiment and the S&P 500 index: 24-week forecast horizon

This table reports estimation results for predictive regressions of market returns on investor sentiment for the U.S. market. The dependent variable is the average weekly return on the S&P500 index over $k = 24$ week forecast horizons. The variables of interest in Panel A, B and C are the bullish ($Bullish^{US}$), bearish ($Bearish^{US}$) and bull-bear spread ($Bullbearsread^{US}$) investor sentiment measures, respectively. Classic economic control variables include the earnings-price ratio EP^{US} , the dividend-payout ratio DE^{US} , the dividend-price ratio DY^{US} , Treasury bill rate TBL^{US} , long-term yield LTY^{US} , term spread TMS^{US} , and default yield spread DFY^{US} of S&P500 index. In the table, t -statistics are based on Newey-West corrected standard errors with 48 lags (reported in brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level. The sample period is January 2020 to December 2021.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullish ^{US}	-0.009 (-1.09)	-0.003 (-0.48)	-0.009 (-1.20)	-0.008 (-1.00)	-0.009 (-1.26)	0.011*** (2.80)	-0.002 (-0.16)	-0.008 (-1.29)
Econ		0.139 (1.65)	0.478 (1.17)	18.143** (2.11)	-0.002 (-1.55)	-0.008*** (-4.92)	-0.002 (-0.95)	0.001 (0.48)
Constant	0.007** (1.99)	-0.000 (-0.07)	0.007 (1.62)	0.006 (1.48)	0.008** (2.02)	0.009*** (4.88)	0.007** (2.12)	0.006** (2.23)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.0241	0.0630	0.0224	0.0329	0.0702	0.4719	0.0908	0.0206

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bearish ^{US}	0.019** (2.05)	0.020** (2.48)	0.019** (2.16)	0.018* (1.94)	0.020** (2.43)	-0.003 (-0.23)	0.017 (0.93)	0.022** (2.57)
Econ		-0.025 (-0.36)	0.576 (1.47)	9.173 (1.01)	-0.002** (-2.30)	-0.007*** (-3.73)	-0.001 (-0.22)	-0.001 (-1.11)
Constant	-0.002 (-0.67)	-0.002 (-0.40)	-0.004 (-1.03)	-0.003 (-0.79)	-0.002 (-0.66)	0.013** (2.53)	-0.001 (-0.11)	-0.002 (-0.52)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.1932	0.1859	0.1972	0.1895	0.2483	0.4347	0.1901	0.1951

Panel C	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullbearsread ^{US}	-0.008 (-1.59)	-0.006 (-1.53)	-0.008* (-1.70)	-0.008 (-1.50)	-0.008* (-1.86)	0.004 (0.97)	-0.005 (-0.56)	-0.008** (-2.13)
Econ		0.067 (0.83)	0.547 (1.36)	13.562 (1.56)	-0.002* (-1.90)	-0.008*** (-4.67)	-0.002 (-0.51)	-0.000 (-0.09)
Constant	0.004*** (3.68)	0.002 (0.40)	0.003** (2.05)	0.003** (2.15)	0.005*** (3.20)	0.013*** (9.02)	0.006** (2.25)	0.004** (2.41)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.1058	0.1055	0.1076	0.1069	0.1572	0.4500	0.1252	0.0965

Table 7

NZ investor sentiment about the U.S. stock market: 12-week forecast horizon

This table reports estimation results for predictive regression of U.S. market returns on New Zealand investor sentiment. The dependent variable is the average weekly return on the S&P500 index over $k = 12$ week forecast horizons. The variables of interest in Panel A, B and C are the bullish ($Bullish^{NZUS}$), bearish ($Bearish^{NZUS}$) and bull-bear spread ($Bullbearsread^{NZUS}$) sentiments of NZ investors on U.S. stock market, respectively. Classic economic control variables include the earnings-price ratio EP^{US} , the dividend-payout ratio DE^{US} , the dividend-price ratio DY^{US} , Treasury bill rate TBL^{US} , long-term yield LTY^{US} , term spread TMS^{US} , and default yield spread DFY^{US} of S&P500 index. In the table, t -statistics are based on Newey-West corrected standard errors with 24 lags (reported in brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level. The sample period is January 2020 to December 2021.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullish ^{NZUS}	-0.026*	-0.029*	-0.026*	-0.026*	-0.019***	-0.008	-0.034**	-0.025*
	(-1.95)	(-1.95)	(-1.90)	(-1.85)	(-2.73)	(-1.33)	(-2.55)	(-1.88)
Econ		-0.120	-0.239	-9.193	-0.009***	-0.008*	0.005*	0.000
		(-0.56)	(-0.41)	(-0.46)	(-7.55)	(-1.75)	(1.84)	(0.08)
Constant	0.014***	0.020*	0.015***	0.015***	0.014***	0.016***	0.013***	0.014**
	(3.40)	(1.69)	(2.87)	(2.68)	(4.78)	(3.07)	(4.28)	(2.33)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.2061	0.2114	0.1984	0.1993	0.5617	0.3005	0.3268	0.1978

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bearish ^{NZUS}	0.019**	0.026*	0.019**	0.020*	0.018***	0.004	0.033***	0.020*
	(2.13)	(1.88)	(2.09)	(1.98)	(2.97)	(0.85)	(2.97)	(1.94)
Econ		-0.266	-0.114	-15.053	-0.010***	-0.008	0.008**	-0.001
		(-1.01)	(-0.20)	(-0.72)	(-10.22)	(-1.58)	(2.44)	(-0.19)
Constant	-0.002	0.006	-0.002	-0.002	0.000	0.012**	-0.014**	-0.002
	(-0.54)	(0.75)	(-0.56)	(-0.45)	(0.18)	(2.12)	(-2.02)	(-0.44)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.2060	0.2502	0.1977	0.2017	0.6375	0.2937	0.4451	0.1984

Panel C	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullbearsread ^{NZUS}	-0.011**	-0.014*	-0.011**	-0.012*	-0.010***	-0.003	-0.018***	-0.012*
	(-2.06)	(-1.94)	(-2.01)	(-1.93)	(-2.86)	(-1.20)	(-2.88)	(-1.91)
Econ		-0.213	-0.186	-14.083	-0.010***	-0.008	0.007**	-0.000
		(-0.88)	(-0.33)	(-0.66)	(-9.07)	(-1.62)	(2.31)	(-0.13)
Constant	0.005***	0.013	0.005***	0.006***	0.007***	0.013***	-0.001	0.005
	(4.24)	(1.37)	(5.97)	(4.83)	(7.64)	(2.96)	(-0.42)	(1.59)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.2164	0.2453	0.2085	0.2118	0.6103	0.2972	0.4090	0.2085

Table 8

NZ investor sentiment about the U.S. stock market: 24-week forecast horizon

This table reports estimation results for predictive regression of U.S. market returns on New Zealand investor sentiment. The dependent variable is the average weekly return on the S&P500 index over $k = 24$ week forecast horizons. The variables of interest in Panel A, B and C are the bullish ($Bullish^{NZUS}$), bearish ($Bearish^{NZUS}$) and bull-bear spread ($Bullbearsread^{NZUS}$) sentiments of NZ investors on U.S. stock market, respectively. Classic economic control variables include the earnings-price ratio EP^{US} , the dividend-payout ratio DE^{US} , the dividend-price ratio DY^{US} , Treasury bill rate TBL^{US} , long-term yield LTY^{US} , term spread TMS^{US} , and default yield spread DFY^{US} of S&P500 index. In the table, t -statistics are based on Newey-West corrected standard errors with 48 lags (reported in brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level. The sample period is January 2020 to December 2021.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullish ^{NZUS}	-0.017*** (-3.32)	-0.016*** (-4.11)	-0.017*** (-3.17)	-0.017*** (-3.25)	-0.016*** (-3.42)	-0.005 (-1.62)	-0.016** (-2.42)	-0.017*** (-4.20)
Econ		0.033 (0.38)	-0.087 (-0.20)	-1.616 (-0.41)	-0.001 (-1.53)	-0.005*** (-4.23)	-0.001 (-0.44)	-0.001 (-0.36)
Constant	0.011*** (6.88)	0.009*** (2.83)	0.011*** (4.66)	0.011*** (6.24)	0.011*** (8.03)	0.012*** (7.64)	0.011*** (7.37)	0.012*** (8.94)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.2921	0.2880	0.2849	0.2848	0.3139	0.4438	0.2916	0.2882

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bearish ^{NZUS}	0.014*** (3.51)	0.015*** (3.91)	0.014*** (3.41)	0.014*** (3.39)	0.014*** (3.82)	0.006* (1.68)	0.015*** (2.77)	0.015*** (3.95)
Econ		-0.061 (-0.64)	-0.031 (-0.07)	-7.792 (-1.42)	-0.002*** (-2.96)	-0.005*** (-4.71)	0.001 (0.33)	-0.001 (-1.01)
Constant	-0.001 (-0.25)	0.001 (0.35)	-0.000 (-0.24)	-0.000 (-0.09)	0.000 (0.03)	0.008*** (4.88)	-0.001 (-0.40)	0.000 (0.17)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.3620	0.3642	0.3552	0.3589	0.4172	0.4561	0.3591	0.3758

Panel C	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bullbearsread ^{NZUS}	-0.008*** (-3.44)	-0.008*** (-4.07)	-0.008*** (-3.33)	-0.008*** (-3.34)	-0.008*** (-3.64)	-0.003 (-1.66)	-0.008*** (-2.71)	-0.009*** (-4.02)
Econ		-0.024 (-0.26)	-0.070 (-0.16)	-6.095 (-1.29)	-0.002** (-2.20)	-0.005*** (-4.53)	0.000 (0.05)	-0.001 (-0.77)
Constant	0.005*** (6.92)	0.006 (1.46)	0.005*** (4.87)	0.005*** (8.16)	0.005*** (5.87)	0.010*** (11.62)	0.005*** (3.45)	0.006*** (3.63)
Econ	None	EP ^{US}	DE ^{US}	DY ^{US}	TBL ^{US}	LTY ^{US}	TMS ^{US}	DFY ^{US}
Adj. R2	0.3477	0.3424	0.3410	0.3431	0.3851	0.4521	0.3408	0.3547

APPENDIX

Figure A.1 plots bullish, bearish and neutral sentiment of NZ versus U.S. individual investors. The grey shaded area indicates the Covid-19 related market sell off between February and April 2020. The two vertical lines indicate the general election held in New Zealand in October 2020 and the U.S. presidential election in November 2020, respectively.

Figure A.1

Bullish, bearish and neutral sentiment of NZ and U.S. individual investors 2020 – 2021

This figure shows the bullish, bearish and neutral sentiment measures of individual investors in New Zealand (solid line) and the U.S. (dashed line) over the period January 2020 to December 2021.

(Please see overleaf)

