

## Article

# Predicting Chinese Stock Market Returns: Rich Information from Business Confidence Index

Yongan Xu <sup>1,2,\*</sup> and Aimin Song <sup>1</sup><sup>1</sup> School of Mathematical Sciences, Gansu Minzu Normal University, Hezuo 747000, China<sup>2</sup> School of Economic & Management, Lanzhou Jiaotong University, Lanzhou 730070, China

\* Correspondence: xyaswjtu@163.com

## Abstract

This study provides new evidence on the predictability of confidence indices in China's stock returns. We demonstrate that, during the sample period from 2005:01 to 2022:12, the business confidence index (BCI) positively and significantly predicted subsequent stock market returns, outperforming mainstream economic predictors and other confidence indices. Further, for the pricing effectiveness of the stock market, the BCI and investor sentiment provide complementary sources of information. The predictive power of confidence indices for stock market returns declined significantly during the COVID-19 pandemic. Meanwhile, confidence indices predicted better during bear market periods compared to bull market periods. Finally, in practical investment applications, the BCI and alternative confidence index produce appreciable economic gains for investors. These empirical results also pass the robustness test.

**Keywords:** business confidence; stock returns; predictability; confidence index; COVID-19

**MSC:** 91G10; 91G30

## 1. Introduction

Based on behavioral finance theory, numerous studies (such as [1–8]) have explored the predictability of stock returns, which is a major concern for market participants. At the same time, investors are susceptible to market confidence; it is hard to avoid behavioral bias in investment strategies. As a result, they tend to be overly optimistic or pessimistic about future stock market trends, leading to irrational market outcomes that diverge from the fundamentals (e.g., [6,9,10]). Therefore, it is of great significance to demonstrate the predictability of stock returns for asset pricing and the long-term development of the stock market (for instance, [11,12]).

The existing literature proves from different perspectives that consumer confidence has a significant effect on the stock market, especially the predictability of the consumer confidence index for stock returns (e.g., [2,13–15]). Consumer confidence comprehensively measures consumers' expectations of the current economic situation, as well as their subjective judgment of economic prospects and psychology, positioning it as a strong indicator [2]. In addition to serving a large number of consumers, enterprises play a pivotal role in the overall market, and their confidence in future expectations may be transmitted to

Academic Editors: J.E. Trinidad-Segovia and Raymond Lee

Received: 28 April 2026

Revised: 8 July 2026

Accepted: 14 July 2026

Published: 19 July 2026

**Copyright:** © 2026 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC BY\) license](https://creativecommons.org/licenses/by/4.0/).

the financial market (see, e.g., [16–18]). Inspired by the above, this paper examines the effect of the business confidence index on stock returns, in accordance with the expected information about future developments in the industrial production sector, enriching existing research on the mechanism of stock price formation from the perspective of consumers [19].

The business confidence index (BCI) provides information on the development of enterprises' production, orders and inventories, as well as future development expectations [16]. It can reflect the turning point of enterprises' output growth and future economic trends from the perspective of future business confidence [20]. The BCI influences the market risk premium by utilizing the channel of expected profits from the real economy and subsequently affects stock returns. Similarly, the composite leading economic index (CLI) is an early signal of economic trends in the business cycle, providing market participants with insight into future economic conditions through selected economic indicators. The CLI has a significant cross-sectional effect on stock returns [21]. As a supplement, this paper discusses the effect of the above confidence index on asset pricing from time-series data and explores the predictive performance of the confidence index on stock returns and its economic value to investors.

In addition, to further verify the strength of the confidence index in predicting stock returns, we selected investor sentiment and the business confidence index of Cheung Kong Graduate School of Business (CKBCI) as comparative indices. The driving effect of investor sentiment on asset pricing has been verified in the literature (e.g., [22–24]). At the same time, the CKBCI represents the expected confidence index of enterprises' short-term operating conditions, derived from the average of four sub-indices: sales, profits, financing conditions and inventories. Specifically, we compare the in-sample and out-of-sample prediction accuracy of the five types of confidence indices mentioned above for stock returns. Statistically, in addition to the business confidence index (BCI), the CLI and CICSII are significant in predicting stock market returns at the 5% level, consistent with evidence from [21,25]. When analyzing the estimation results of the bivariate prediction model, the evidence suggests that the BCI explicitly predicts stock market returns when controlling for the composite leading index, implying that its return forecasting ability is substantially greater than that of the CLI in the Chinese stock market. Furthermore, when discussing the results of the bivariate prediction model involving the BCI and CICSII, we discovered that both the BCI and CICSII maintain predictive power at 5%, with  $R^2$  values reaching 6.967%, close to the sum of the corresponding  $R^2$  statistics of the two indices. The empirical results indicate that the BCI and CICSII provide complementary expectation information for the stock market. In short, the business confidence index, as an expectation indicator of business operations, contains more information about the future market trend of corporations and is an excellent predictor of stock returns in the Chinese market.

We found that the business confidence index significantly enhanced prediction accuracy for Chinese stock market returns for the sample period from January 2005 to December 2022. Statistically, the in-sample estimations indicate that a standard deviation augmentation of BCI causes a subsequent 1.867% increase in aggregate market returns, with an in-sample  $R^2$  statistic of 5.285%. Furthermore, the out-of-sample predictive power of the BCI remains robust, and the out-of-sample  $R^2_{os}$  statistic reaches 3.217% when considering the evaluation interval of 2011:01 to 2022:12. In particular, the BCI remains strong and has significant power to forecast the stock market in short and medium horizons. In addition, in terms of the predictability of economic variables, we consider the nine economic variables in connection with the Chinese macro-fundamentals, such as the financial stress index [26], realized volatility [27], skewness [28], kurtosis [28], dividend ratio [29], dividend yield [30,31], dividend payout ratio [11], CPI [32] and PPI [33]. The empirical

evidence shows that the BCI has significant predictive ability for stock returns relative to the nine economic variables and achieves beneficial economic gains for investors.

We also explored the prediction accuracy of the BCI during the sub-sample period. The predictability of the BCI for stock returns is stronger during high-BCI periods than during low-BCI periods. In the short term, the BCI exhibits a momentum effect for subsequent stock returns. However, for slightly longer forecast horizons, the momentum effect of the BCI during periods of low business confidence gradually decreases, but the reverse effect appears at longer horizons. Moreover, when considering the performance of all confidence indices over different economic cycles, the confidence indices show heterogeneous effects in bull and bear markets (see, e.g., [9,14,34]). The estimation results indicate that the confidence indices are better at predicting stock returns in bear markets than in bull markets. Expectations of confidence can capture shifts in investors' risk aversion in a timely manner, leading to temporary mispricing and thus helping predict stock returns [7]. During bear market periods, corporations are more cautious and patient in making strategic decisions, and the business confidence index is more accurate in reflecting market expectations during economic downturns. We also analyze and compare the predictive performance of the confidence indices before and during the COVID-19 pandemic.

Our work contributes to the study of asset pricing and the predictability of business confidence for stock returns. Specifically, this study presents several significant findings. First, we discuss the predictability of the business confidence index on stock returns. We explore the impact of future expectations on asset prices from the perspective of enterprises, enriching the existing literature on asset pricing from the perspective of consumer confidence and investor sentiment. Secondly, the business confidence index exhibits a momentum effect for subsequent stock returns in the short horizon, but the reverse effect appears over long horizons. Compared to the popular economic variables and familiar confidence indices, the BCI has significant predictability for stock returns and results in beneficial economic gains for investors. Thirdly, our paper finds evidence that the predictability of the BCI for stock returns is stronger during high-BCI periods than during low-BCI periods. The estimation results indicate that the confidence indices are better at predicting stock returns for bear markets than bull markets. During bear markets, corporations are more cautious and patient in making strategic decisions, and the business confidence index is more accurate in reflecting market expectations during economic downturns. Finally, the BCI and CLI significantly enhance the forecasting precision of stock returns before the outbreak of the COVID-19 pandemic. At the same time, other alternative confidence indices exhibit poor predictability for the stock market. Following the outbreak of the pandemic, a decline in business confidence led firms to expect a temporary drop in demand. In this case, an impending drop in demand would lead to lower prices or an increase in inventories of unsold goods, both of which would similarly reduce a firm's profitability, providing a convincing explanation for the mechanism by which business confidence affects the stock market.

The rest of the study is arranged as follows. Section 2 presents data relevant to this paper. Section 3 presents the in-sample empirical evidence for all confidence indices. The out-of-sample estimation results are shown in Section 4. In Section 5, we assess the economic value of the confidence indices. Section 6 reports the results of the robustness test. Finally, Section 7 concludes the paper.

## 2. Materials and Data

### 2.1. Relevant Stock Market Data

The relevant data is selected from authoritative databases, including CSMAR, Wind, and OECD data platforms. Inspired by [5,35], the monthly excess return of the stock market ( $R^m$ ) is calculated by deducting the risk-free rate from the monthly return of the Chinese A-share market (including dividends). It can be observed from Panel A in Table 1 that during the sample period from January 2005 to December 2022, we obtained a simple description of the excess return of the aggregate market, in which the mean and standard deviation were 1.027% and 8.138, respectively, and the Sharpe ratio of the stock market was 0.126.

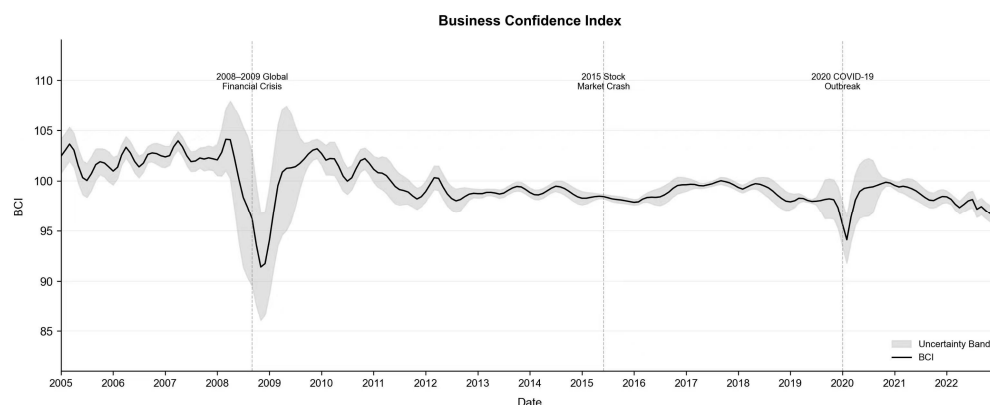
**Table 1.** The summary statistics of the relevant variables.

| Variables                               | Mean   | Std    | Skew   | Kurt   | Sharpe Ratio | ADF         |
|-----------------------------------------|--------|--------|--------|--------|--------------|-------------|
| Panel A: Stock market returns           |        |        |        |        |              |             |
| $R^m$ (%)                               | 1.027  | 8.138  | −0.141 | 4.521  | 0.126        | −18.008 *** |
| Panel B: Alternative confidence indices |        |        |        |        |              |             |
|                                         | P25    | Median | P75    | Skew   | Kurt         |             |
| BCI                                     | −0.350 | −0.005 | 0.328  | 0.287  | 8.472        | −6.450 ***  |
| CLI                                     | −0.125 | −0.007 | 0.096  | −8.153 | 111.412      | −14.974 *** |
| CCI                                     | −0.292 | 0.109  | 0.466  | −3.502 | 24.809       | −4.626 ***  |
| CICSI                                   | −0.608 | −0.015 | 0.615  | 0.123  | 3.435        | −5.291 ***  |
| CKBCI                                   | −0.556 | 0.118  | 0.663  | −0.411 | 3.650        | −5.026 ***  |
| Panel C: Economic variables             |        |        |        |        |              |             |
|                                         | P25    | Median | P75    | Skew   | Kurt         |             |
| FSI                                     | −0.630 | −0.010 | 0.552  | 0.355  | 4.244        | −10.963 *** |
| RV                                      | −0.648 | −0.394 | 0.284  | 2.203  | 9.401        | −5.685 ***  |
| RSKEW                                   | −0.584 | 0.029  | 0.627  | 0.138  | 3.587        | −12.183 *** |
| RKURT                                   | −0.657 | −0.134 | 0.639  | 0.925  | 4.897        | −7.907 ***  |
| DP                                      | −0.456 | 0.089  | 0.650  | −0.474 | 3.262        | −4.410 ***  |
| DY                                      | −0.431 | 0.079  | 0.627  | −0.492 | 3.370        | −4.254 ***  |
| DE                                      | −0.676 | −0.510 | −0.139 | 1.150  | 2.484        | −8.215 ***  |
| CPI                                     | −0.527 | −0.209 | 0.300  | 0.860  | 4.315        | −4.412 ***  |
| PPI                                     | −0.811 | 0.167  | 0.791  | −0.030 | 2.178        | −4.614 ***  |

Notes: This table displays a summary of statistics for the relevant variables, including stock market returns ( $R^m$ ), alternative confidence indices, and economic variables. Specifically, alternative confidence indices include the business confidence index (BCI), composite leading index (CLI), consumer confidence index (CCI), investor sentiment index (CICSI), and business confidence index of Cheung Kong Graduate School (CKBCI). There are nine economic variables, including FSI, RV, RSKEW, RKURT, DP, DY, DE, CPI, and PPI. In Panel A, the mean (Mean), standard deviation (Std), skewness (Skew), kurtosis (Kurt), and Sharpe ratio (Sharpe ratio) of the stock market returns are successively exhibited. Panels B and C show the 25% quantile (P25), 50% quantile (P50), skewness (Skew), and kurtosis (Kurt) of the alternative confidence indices and nine economic variables. ADF represents the Augmented Dickey–Fuller test result. \*\*\* indicates statistical significance at the 1% level. Among all the related variables, the CKBCI ranges from 2012:01 to 2021:12 due to data limitations; the sample period for other variables is 2005:01–2022:12.

Furthermore, five confidence indices are used in the study. The business confidence index (BCI), obtained from the OECD database, contains more information on future business confidence, including various aspects of the industrial sector. Figure 1 displays the BCI variation trend across the sample periods. The composite leading index (CLI), also obtained from the OECD platform, contains information on short-term economic trends

obtained via early turning point signals during the business cycle [21]. It also represents fluctuations in economic activity around its long-run potential level. Moreover, the consumer confidence index (CCI) indicates the strength of consumers' confidence in expectations and measures the extent to which consumers are optimistic or pessimistic about their financial future. It is also an indicator of consumer confidence in the economy. The composite investor sentiment index (CICSI) employs PCA to extract sentiment factors from six commonly used sentiment indicators in the Chinese financial market [36], showing the investment intentions and expectations of market participants. The Cheung Kong Graduate School of Business conditions index (CKBCI) is another name for the Chinese enterprise operating conditions index. In terms of the calculation method, the BCI is a diffusion index. It represents the percentage of economic indicators in the expansion state at a certain point based on the cyclic fluctuation measured for each economic indicator. The index is derived from the arithmetic average of four sub-indices: sales, profit, financing environment and inventory. These represent an enterprise's expected investment, cost, and price. The sample was taken from December 2012.



**Figure 1.** The trend of the business confidence index (BCI) during the sample period.

Furthermore, according to [21], to capture the full extent of the expected economy's conditions in the confidence index while ensuring the stability of the data, we utilized the monthly variation in the above confidence indices as proxies for the corresponding confidence indices. Table 2 shows the correlation coefficient between the five confidence indices using two methods: Pearson correlation and Spearman correlation analysis. The estimations in Table 2 show a strong positive correlation between the BCI and CLI, suggesting that business confidence, measured by future expectations across multiple industries, has a powerful impact on the composite leading index.

**Table 2.** The correlation coefficient between the alternative confidence indices.

|       | BCI       | CLI       | CCI      | CICSI    | CKBCI   |
|-------|-----------|-----------|----------|----------|---------|
| BCI   | 1.000     | 0.352 *** | 0.081    | −0.126   | 0.096   |
| CLI   | 0.588 *** | 1.000     | 0.082    | −0.158 * | 0.148 * |
| CCI   | 0.124     | 0.173 *   | 1.000    | −0.002   | 0.097   |
| CICSI | −0.076    | −0.035    | 0.025    | 1.000    | −0.036  |
| CKBCI | −0.015    | 0.100     | 0.184 ** | −0.067   | 1.000   |

Notes: This table reports the correlation coefficient between the alternative confidence indices. In particular, the lower-left values represent the Pearson correlation coefficient, and the upper-right values represent the Spearman correlation coefficient. \*, \*\*, or \*\*\* represent significance at the 10%, 5%, and 1% levels, respectively.

## 2.2. Variables of the Economy

In addition, to compare the alternative confidence indices, we select nine economic variables closely linked to the Chinese market. Each variable is briefly described as follows:

Financial Stress Index (FSI): The index constructed in [26].

Volatility (RV): Realized volatility calculated by [27].

Realized skewness of the stock market (Rskew): Based on the measure in [28].

Realized Kurtosis of the stock market (Rkurt): Based on the measure in [28].

Dividend ratio (DP): The ratio of the logarithm of the total dividend to the logarithm of the total market value of all listed companies.

Dividend yield (DY): The difference between the logarithm of the sum of dividends of all listed companies and the logarithm of the sum of lagged market capitalization.

Dividend payout ratio (DE): The logarithmic difference between the sum of dividends and the sum of earnings of all listed companies.

Inflation rate (CPI): The consumer price index of the sample period.

Producer price index (PPI): The producer price index of the sample period.

In particular, the sample period for the relevant data in this study is 2005:01 to 2022:12, except for CKBCI, which covers 2012:12 to 2022:12. Furthermore, the five alternative confidence indices and nine economic variables are standardized with a mean of zero and a variance of one. As reported in Panel B of Table 1, all five alternative confidence indices have a sharp peak and a fat tail, and the BCI and CICI are right-skewed, while the other three confidence indices are left-skewed. The statistical results for the nine economic variables are shown in Panel C.

### 3. In-Sample Prediction Effect

#### 3.1. The In-Sample Forecasting Model

In this section, we examine the return on predictability of the business confidence index (BCI) for the Chinese stock market. First, motivated by [37], our main purpose was to test the in-sample prediction ability of the BCI over multiple-horizon periods based on the estimated results of forecasting Equation (1):

$$R_{t+1 \rightarrow t+h}^m = \alpha + \beta BCI_t^k + \varepsilon_{t+1 \rightarrow t+h} \quad (1)$$

where  $BCI_t$  denotes the business confidence index of China's market at  $t$  months and  $R_{t+1 \rightarrow t+h}^m$  is the  $h$ -month cumulative stock market return from  $t + 1$  months to  $t + h$  months. Statistically,  $t$ -stat is the adjusted statistic of [38], with a maximum lag order of one. The estimated slope  $\beta$  indicates the predictive power of the BCI for stock market returns.

In Table 3, over the one-month horizon, the BCI has a significant positive effect on the next month's stock returns, with a coefficient  $\beta$  of 1.867% and an  $R^2$  value of 5.285%. This evidence implies that a one-standard-deviation increase in the BCI leads to a subsequent 1.867% increase in stock market returns. When considering the multiple horizons shown from two to four months in Table 3, the prediction ability of the BCI for the stock market remains strong and significant. The  $R^2$  values are also higher than 4%. However, the comparison also shows that the magnitude of slope  $\beta$  decreases with increasing forecasting horizons  $h$  from 1.417% to 0.999%. Furthermore, when the forecasting horizon  $h$  exceeds five months, the predictive power of the BCI gradually diminishes. In other words, the in-sample return predictability of the BCI is significant and effective for short horizons. Market participants form unified optimistic or pessimistic expectations based on the BCI, which directly drives the movement of stock prices. In the long horizon, however, the overly convergent market sentiment and trading demand gradually return to

rationality. The confidence index measures changes in corporate sentiment based on future alterations in profits, reflected in the sentiment of both buyers and sellers of shares. This feeds into stock prices [39].

**Table 3.** Business confidence index (BCI) and stock market returns.

| Horizon | $\alpha$ (%) | $t$ -Stat | $\beta$ (%) | $t$ -Stat | $R^2$ (%) | Adj. $R^2$ (%) |
|---------|--------------|-----------|-------------|-----------|-----------|----------------|
| 1       | 1.062 *      | 1.939     | 1.867 ***   | 2.703     | 5.285     | 4.810          |
| 2       | 1.057 ***    | 2.527     | 1.417 ***   | 3.004     | 5.271     | 4.707          |
| 3       | 1.064 ***    | 2.934     | 1.190 **    | 2.524     | 4.987     | 4.442          |
| 4       | 1.063 ***    | 3.232     | 0.999 **    | 2.237     | 4.344     | 3.843          |
| 5       | 1.077 ***    | 3.423     | 0.725       | 1.612     | 2.569     | 2.099          |
| 6       | 1.094 ***    | 3.609     | 0.4083      | 1.071     | 0.900     | 0.443          |
| 9       | 1.129 ***    | 4.193     | 0.1394      | 0.441     | 0.138     | −0.370         |
| 12      | 1.162 ***    | 4.408     | −0.255      | −0.981    | 0.494     | −0.041         |

Notes: This table shows the estimations of the prediction regression model over the multi-horizon period. The multi-horizon prediction model is represented by Equation (1). \*, \*\*, or \*\*\* represent significance at the 10%, 5%, and 1% levels, respectively. The sample period of related variables is 2005:01–2022.12.

Moreover, according to [40], economic variables play an important role in forecasting stock returns. Thus, it is necessary to compare the prediction accuracy of the BCI and nine economic variables on stock market returns. Based on Equation (2), we tested the prediction accuracy of nine economic variables on stock market returns:

$$R_{t+1}^m = \alpha + \psi Z_t^K + \varepsilon_{t+1} \quad (2)$$

where  $Z_t^K$  represents one of the nine economic variables at  $t$  months: FSI, RV, RSKEW, RKURT, DP, DY, DE, CPI, and PPI. The excess stock returns in month  $t + 1$  are represented by  $R_{t+1}^m$ . Statistically,  $t$ -stat is the adjusted statistic from [38], with a maximum lag order of one. Further, to examine whether the BCI contains more market information than the economic variables, we used Equation (3) to analyze the statistical significance of the regression slope  $\beta$ . If significant, it indicates that the BCI provides predictive information that the economic variables do not.

$$R_{t+1}^m = \alpha + \beta BCI_t + \psi Z_t^K + \varepsilon_{t+1} \quad (3)$$

In Table 4, Panel A shows that among the nine economic variables, only the FSI, CPI, and PPI significantly impact the stock returns in the subsequent month. The FSI is a reflection indicator of the financial conditions, and variations profoundly impact the stock market (for instance, [26,41]). A slightly higher CPI indicates that an individual's consumption level increases and that they generally have excess funds for investment. The stock market is an optional investment channel for investors, and changes in investment strategy lead to the rise in stock prices [42]. However, a higher CPI is not always better, as it can lead to higher inflation. Panel B in Table 4 shows that the BCI maintains 5% statistical significance when controlling for economic factors in the bivariate prediction model. The regression slope  $\beta$  ranges from 2.188% to 3.020%. Further, by comparing the corresponding  $R^2$  statistics in Panel A and Panel B, the prediction results suggest that compared to the business confidence index, the economic variables FSI, CPI, PPI, and BCI include complementary market information. The  $R^2$  values of the bivariate forecasting model considering the above three factors are 8.332%, 8.579%, and 6.992%, respectively. These values are clearly higher than the corresponding  $R^2$  value of 5.285% in Table 3 when the BCI is

considered alone. To summarize, in-sample prediction evidence suggests that the BCI significantly enhances prediction accuracy on stock market returns, and its predictive performance is pronouncedly stronger than that of economic variables.

**Table 4.** In-sample comparisons with economic variables.

| Panel A: Univariate Prediction Model                  |            |        |                    |                        |             | Panel B: Bivariate Prediction Model                                 |            |        |                    |                    |
|-------------------------------------------------------|------------|--------|--------------------|------------------------|-------------|---------------------------------------------------------------------|------------|--------|--------------------|--------------------|
| $R_{t+1}^m = \alpha + \psi Z_t^K + \varepsilon_{t+1}$ |            |        |                    |                        |             | $R_{t+1}^m = \alpha + \beta BCI_t + \psi Z_t^K + \varepsilon_{t+1}$ |            |        |                    |                    |
| Variables                                             | $\psi$ (%) | t-Stat | R <sup>2</sup> (%) | Adj.R <sup>2</sup> (%) | $\beta$ (%) | t-Stat                                                              | $\psi$ (%) | t-Stat | R <sup>2</sup> (%) | Adj.R <sup>2</sup> |
| FSI                                                   | −1.884 *** | −2.824 | 5.282              | 4.813                  | 2.221 **    | 2.249                                                               | −1.500 **  | −2.427 | 8.332              | 7.420              |
| RV                                                    | −0.014     | −0.018 | 0.000              | −0.478                 | 2.877 ***   | 2.807                                                               | 0.224      | 0.273  | 5.360              | 4.432              |
| RSKEW                                                 | 0.741      | 1.213  | 0.825              | 0.384                  | 2.728 **    | 2.562                                                               | 0.472      | 0.761  | 5.613              | 4.711              |
| RKURT                                                 | −0.182     | −0.263 | 0.050              | −0.418                 | 2.828 ***   | 2.684                                                               | −0.119     | −0.182 | 5.307              | 4.382              |
| DP                                                    | 0.419      | 0.595  | 0.266              | −0.207                 | 2.849 ***   | 2.722                                                               | 0.460      | 0.658  | 5.606              | 4.681              |
| DY                                                    | 0.649      | 0.931  | 0.640              | 0.165                  | 2.796 ***   | 2.671                                                               | 0.567      | 0.822  | 5.773              | 4.846              |
| DE                                                    | −0.290     | −0.529 | 0.127              | −0.356                 | 3.020 ***   | 2.849                                                               | −0.660     | −1.265 | 5.923              | 4.981              |
| CPI                                                   | −1.934 *** | −2.810 | 5.671              | 5.225                  | 2.188 **    | 2.153                                                               | −1.534 **  | −2.230 | 8.579              | 7.688              |
| PPI                                                   | −1.569 **  | −2.466 | 3.731              | 3.296                  | 2.332 **    | 2.180                                                               | −1.112 *   | −1.743 | 6.992              | 6.102              |

Notes: This table shows the in-sample prediction effect of the BCI when considering economic variables by means of univariate and bivariate regression models. The nine economic variables relate to the fundamentals, including *FSI*, *RV*, *RSKEW*, *RKURT*, *DP*, *DY*, *DE*, *CPI*, and *PPI*. \*, \*\*, or \*\*\* represent significance at the 10%, 5%, and 1% levels, respectively. The sample period of the economic variables is 2005:01–2022.12.

### 3.2. Comparison to the Alternative Confidence Index

In the financial market, several alternative confidence indices are measured from different perspectives to illustrate the powerful predictive ability of the BCI on the stock market. Using Equation (4), the predictive performance of the BCI and other alternative confidence indices on stock returns is compared to further illustrate the powerful predictive power of the BCI for the Chinese stock market.

$$R_{t+1}^m = \alpha + \beta BCI_t + \delta ACI_t^h + \varepsilon_{t+1}, \quad ACI^h = CLI, CCI, CICS I \text{ and } CKBCI \quad (4)$$

Here,  $ACI_t^h$  denotes the four alternative confidence indices of CLI, CCI, CICS I, and CKBCI in month *t*. Statistically, t-stat is the adjusted statistic of [38], with a maximum lag order of one.

Table 5 reports comparative evidence of the predictive performance between the BCI and other alternative confidence indices. Rows 1, 2, 4, 6, and 8 in Table 5 exhibit the regression results, involving the slope  $\beta$  ( $\delta$ ), the corresponding t statistics, as well as in-sample R<sup>2</sup> values, which signify the return forecasting ability of five confidence indices based on the univariate regression model. Specifically, in addition to the business confidence index, the CLI and CICS I remain significant in predicting stock market returns at the 5% level, consistent with evidence from [21]. When analyzing the estimation results of the bivariate prediction model, the evidence in row 3 of Table 5 suggests that the BCI still explicitly predicts stock market returns when controlling for the composite leading index, implying that the return forecasting ability of the BCI is substantially greater than that of the CLI in the Chinese stock market. Similarly, the estimations in rows 5 and 9 show that, relative to the CCI and CKBCI, the BCI significantly enhances the return prediction accuracy. Furthermore, when analyzing the results of the bivariate prediction model involving the BCI and CICS I, we discovered that both the BCI and CICS I maintain predictive power at 5%, and the R<sup>2</sup> value reaches 6.967%, close to the sum of the corresponding R<sup>2</sup> statistics of the two indices. The above evidence indicates that the BCI and CICS I provide complementary expectation information about the stock market. Statistically, a negative adjusted

$R^2$  means the full set of competing comparative predictors (CCI, CKBCI, and other economic variables) jointly delivers limited incremental explanatory power for stock returns after accounting for parameter penalties. However, this weak overall fit does not invalidate our model setup or core conclusions [37]. Appendix Table A1 demonstrates that after considering multiple factors, the estimated results of the BCI remain robust [43].

All in all, compared to other confidence indices, the BCI, as an indicator of expected business operations, contains more information about the future market trends of corporations and is a distinguished predictor of stock returns in the Chinese market.

**Table 5.** In-sample comparison with alternative confidence indices.

|               | (1)                  | (2)                 | (3)                 | (4)              | (5)                  | (6)                   | (7)                   | (8)                | (9)                  | (10)                  |
|---------------|----------------------|---------------------|---------------------|------------------|----------------------|-----------------------|-----------------------|--------------------|----------------------|-----------------------|
| BCI           | 1.867 ***<br>[2.703] |                     | 1.571 **<br>[2.079] |                  | 1.870 ***<br>[2.704] |                       | 1.812 ***<br>[2.674]  |                    | 1.734 ***<br>[2.612] | 1.533 **<br>[2.054]   |
| CLI           |                      | 1.375 **<br>[2.022] | 0.772<br>[1.418]    |                  |                      |                       |                       |                    |                      | 0.732<br>[1.2051]     |
| CCI           |                      |                     |                     | 0.132<br>[0.337] | 0.162<br>[0.380]     |                       |                       |                    |                      | 0.051<br>[0.125]      |
| CICSI         |                      |                     |                     |                  |                      | −1.150 **<br>[−2.521] | −1.054 **<br>[−2.320] |                    |                      | −1.037 **<br>[−2.285] |
| CKBCI         |                      |                     |                     |                  |                      |                       |                       | −0.533<br>[−1.128] | −0.521<br>[−1.188]   |                       |
| $R^2$ (%)     | 5.285                | 2.866               | 6.057               | 0.027            | 5.325                | 2.004                 | 6.967                 | 0.728              | 3.779                | 7.683                 |
| $Adj.R^2$ (%) | 4.810                | 2.406               | 5.139               | −0.220           | 4.554                | 1.309                 | 5.910                 | −0.162             | 2.084                | 6.355                 |

Notes: In this table, univariate and bivariate regression models are used to compare the prediction accuracy of BCI with other alternative confidence indicators (Equation (4)). \*\* and \*\*\* represent significance at the 5% and 1% levels, respectively. Among the five confidence indices, the CKBCI only covers 2012:01 to 2021:12 due to data limitations; the sample period for other confidence indices is 2005:01–2022.12.

### 3.3. Estimates Within Different Sub-Samples

In this section, following references [24,44], we analyze the return predictability of the BCI across different sub-samples based on the two-state prediction model expressed by Equation (5). According to the median of the BCI over the full sample period [4], the study sample is split into high-BCI and low-BCI periods to explore its predictive performance across the sub-samples.

$$R_{t+1-\lambda+h}^m = \alpha + \beta^{\text{high}} BCI_t I_t^{\text{high}} + \beta^{\text{low}} BCI_t I_t^{\text{low}} + \varepsilon_{t+1-\lambda+h} \quad (5)$$

Similarly to the division method in [45], when the numerical value of the BCI in month  $t$  is larger (or smaller) than the median of the BCI over the whole sample period,  $I_t^{\text{high}}$  ( $I_t^{\text{low}}$ ) is equal to one; otherwise, it is zero.  $\beta^{\text{high}}$  ( $\beta^{\text{low}}$ ) represents the estimation slope over the high (or low) BCI period. Statistically,  $t$ -stat is the adjusted statistic from [38], with a maximum lag order of one.

Table 6 reports sub-sample evidence for the multiple-horizon forecasting period. On the one-month horizon, the estimated slope  $\beta^{\text{high}}$  is significant at 1%, with a  $\beta^{\text{high}}$  value of 3.498% and a corresponding  $t$  statistic of 2.942. By contrast, the estimated slope over the low-BCI period insignificantly predicts next month's stock returns. When the forecasting horizon is between two-month and semi-annual periods, the slopes of  $\beta^{\text{high}}$  remain significant at the 1% level, but the estimations of  $\beta^{\text{high}}$  are not significant, implying that the prediction accuracy of the BCI during low-BCI periods underperforms compared to high-BCI periods. Moreover, as the forecasting horizon exceeds semi-annual periods, the business confidence index profoundly impacts the stock market during both high-BCI and low-BCI

periods. However, the difference is that the momentum effect is displayed during the high-BCI period, and the reverse occurs during the low-BCI period, indicating that low business confidence leads to weak stock market trends and a decline in stock prices.

**Table 6.** The in-sample results of the short- and long-horizon forecasting periods.

| Horizons | $\beta^{high}$ | <i>t</i> -Stat | $\beta^{low}$ | <i>t</i> -Stat | $R^2$ (%) | <i>Adj.R</i> <sup>2</sup> (%) |
|----------|----------------|----------------|---------------|----------------|-----------|-------------------------------|
| 1        | 3.498 ***      | 2.942          | 2.165         | 1.071          | 5.469     | 4.551                         |
| 2        | 3.265 ***      | 3.775          | 1.057         | 0.813          | 6.219     | 5.234                         |
| 3        | 2.817 ***      | 3.821          | 0.818         | 0.586          | 6.055     | 5.150                         |
| 4        | 2.768 ***      | 4.478          | 0.300         | 0.231          | 6.275     | 5.349                         |
| 5        | 2.441 ***      | 3.441          | −0.200        | −0.160         | 5.005     | 4.106                         |
| 6        | 2.025 ***      | 3.070          | −0.739        | −0.736         | 3.766     | 2.873                         |
| 9        | 2.026 ***      | 3.963          | −1.598 ***    | −2.436         | 6.338     | 5.465                         |
| 12       | 1.572 ***      | 3.252          | −2.239 ***    | −4.789         | 7.515     | 6.626                         |

Notes: In Table 6, we use the regression model, Equation (5), to analyze the in-sample results for the long-horizon forecasting period using the BCI [44]. \*\*\* represents significance at the 1% levels. The sample period of BCI is 2005:01–2022:12.

In other words, the BCI's stock return predictability is stronger during high-BCI than low-BCI periods. In short horizons, the BCI exhibits the momentum effect for subsequent stock returns. However, for slightly longer forecast horizons, the BCI's momentum effect diminishes during a period of low business confidence, and the reverse effect occurs during long-horizon periods.

## 4. Out-of-Sample Estimation Results

### 4.1. Out-of-Sample Predictive Performance

Although the empirical evidence in Section 3 argues that the BCI exhibits outstanding in-sample forecasting ability for China's market, the evidence also suggests that out-of-sample predictability can better achieve real-time forecasts for investors and provide more reliable evidence to evaluate the predictive effectiveness of a predictor [29].

Statistically, we divided the full sample period into two parts: an in-sample period of *m* months and an out-of-sample evaluation period of *q* months. Specifically, we took 2011:01–2022:12 as the out-of-sample assessment period. Further, we obtained the first out-of-sample return forecast  $\hat{R}_{t+1}$  based on Equation (6).

$$\hat{R}_{t+1} = \hat{\alpha}_t + \hat{\beta}_t S_t \quad (6)$$

In Equation (6),  $\hat{\alpha}_t$  and  $\hat{\beta}_t$  denote the OLS estimates of the constant and slope obtained from a regression  $\{R_t\}_{t=1}^{t-1}$  on a univariate prediction model with a constant  $\{S_t\}_{t=1}^{t-1}$ , respectively. Similarly to the process of obtaining the first out-of-sample forecasts, we achieved the second return forecast  $\hat{R}_{t+2}$  on the basis of the following equation:

$$\hat{R}_{t+2} = \hat{\alpha}_{t+1} + \hat{\beta}_{t+1} S_{t+1} \quad (7)$$

Further, the recursive regression approach is used to iterate the calculation process *q* times until the predicted value of *q* stock returns is obtained [46]. Then, inspired by [41,46], we explored the out-of-sample predictive performance of the predictor, utilizing  $R_{OS}^2$  statistics, with the following equation:

$$R_{OS}^2 = 1 - \frac{\sum_{k=1}^q (R_{m+k} - \hat{R}_{m+k})^2}{\sum_{k=1}^q (R_{m+k} - \bar{R}_{m+k})^2} \quad (8)$$

In Equation (8),  $\bar{R}_{m+k}$  and  $\hat{R}_{m+k}$  represent the historical average and forecasts of the stock return in the month  $m+k$ , respectively.  $R_{m+k}$  is the stock market returns at month  $m+k$ . A positive  $R_{OS}^2$  value suggests that the forecasting power of predictors surpasses the historical average benchmark. Furthermore, a significant percentage of the literature argues that there is clear heterogeneity in the forecasting performance of predictors in different economic cycles [11,47–49]. Thus, we computed the corresponding  $R_{OS}^2$  values ( $R_{OS,bull}^2$  and  $R_{OS,bear}^2$ ) for different economic cycles (bull and bear) according to the following equation:

$$R_{OS}^2 = 1 - \frac{\sum_{k=1}^q I_{m+k}^c (R_{m+k} - \hat{R}_{m+k})^2}{\sum_{k=1}^q I_{m+k}^c (R_{m+k} - \bar{R}_{m+k})^2}, \text{ for } c = \text{bull, bear} \quad (9)$$

If  $I_{m+k}^{\text{bull}}$  ( $I_{m+k}^{\text{bear}}$ ) is equal to one, it means that the month  $m+k$  is in the bull (bear) stage of China's stock market; otherwise, it is zero. The division approach of economic cycles in this study follows [35,50].

As can be observed from the out-of-sample estimations in Table 7, the BCI shows significantly superior prediction capability for stock returns, with an  $R_{OS}^2$  value of 3.217% and a corresponding MSFE-adj statistic of 2.960. The CLI also profoundly enhances the prediction accuracy of stock returns, and its out-of-sample  $R_{OS}^2$  and MSFE-adj values reach 2.341% and 2.267, respectively. The evidence demonstrates that the predictability of both the BCI and CLI far exceeds that of the historical average baseline. Moreover, the other alternative confidence indices, including the CCI, CICS, and CKBCI, all generate insignificant  $R_{OS}^2$  values; in particular, the out-of-sample  $R_{OS}^2$  values of the CCI and CKBCI are negative, implying that their prediction effect is far behind the benchmark forecasts. The above evidence shows that, among all the confidence indices, the business confidence index has a top-class prediction capability, followed by the CLI; the forecasting effect of the other confidence indices is substantially inferior.

In addition, by comparing the results in the last two rows of Table 7, we observe that, among all five confidence indices, the  $R_{OS,bear}^2$  values in the bear market are obviously greater than the  $R_{OS,bull}^2$  values in the bull market. The confidence index shows heterogeneous effects in different economic cycles (see, e.g., [9,14,34]). These estimation results indicate that the confidence indices are better at predicting stock returns in the bear than the bull market. Expectations of confidence can capture changes in investors' risk aversion over time, leading to temporary mispricing and thus perhaps helping predict stock returns [3]. In a bear market, corporations are more cautious and patient in making strategic decisions, and business confidence indices are more accurate in reflecting market expectations during economic downturns. The estimated results in Appendix Table A2 show that, even after applying the Monte Carlo approach, the BCI still maintains excellent predictive capabilities.

**Table 7.** The out-of-sample predictive effects of alternative confidence indices.

| Variables | $R_{OS}^2$ (%) | MSFE-adj | p-Value | $R_{OS,bull}^2$ (%) | $R_{OS,bear}^2$ (%) |
|-----------|----------------|----------|---------|---------------------|---------------------|
| BCI       | 3.217 ***      | 2.960    | 0.002   | −0.739              | 5.472               |
| CLI       | 2.341 **       | 2.267    | 0.012   | 0.893               | 2.980               |
| CCI       | −0.079         | 0.499    | 0.309   | −3.114              | 1.875               |
| CICS      | 1.189          | 1.347    | 0.090   | −5.312              | 5.268               |
| CKBCI     | −3.995         | −2.272   | 0.014   | −4.281              | −3.385              |

Notes: Table 7 shows the out-of-sample predictive effects of all five confidence indices.  $R_{OS}^2$  statistics measure the out-of-sample predictive performance of the BCI relative to the baseline model (historical mean benchmark).  $R_{OS,bull}^2$  and  $R_{OS,bear}^2$  represent the  $R_{OS}^2$  statistics for the bull and bear markets,

respectively. \*\* and \*\*\* represent significance at the 5% and 1% levels, respectively. Among all confidence indices, the length of the out-of-sample evaluation period is 72 months. In particular, the out-of-sample evaluation period of the *CKBCI* only ranges from 2017:01 to 2020:12 due to data limitations; the out-of-sample evaluation period of other confidence indices is 2011:01–2022.12.

#### 4.2. The Performance of Confidence Indices Before and During the COVID-19 Pandemic

Most studies demonstrate clear differences in stock market responses to exogenous factors between the pre- and post-COVID-19 pandemic periods. The effect of the confidence index on the stock market was heterogeneous before and during the COVID-19 pandemic. Thus, in this section, we discuss the predictability of stock returns before and during the COVID-19 pandemic for the five confidence indicators covered in this study (Table 8).

**Table 8.** The predictability of alternative confidence indices before and during the COVID-19 pandemic.

|              | Panel A: Before COVID-19 Pandemic |            |            | Panel B: During COVID-19 Pandemic |            |            |
|--------------|-----------------------------------|------------|------------|-----------------------------------|------------|------------|
|              | $R_{os}^2$ (%)                    | $MSFE-adj$ | $p$ -Value | $R_{os}^2$ (%)                    | $MSFE-adj$ | $p$ -Value |
| <i>BCI</i>   | 2.465 **                          | 1.850      | 0.034      | −0.057                            | 1.856      | 0.037      |
| <i>CLI</i>   | 3.314 **                          | 2.068      | 0.021      | −10.364                           | 1.205      | 0.119      |
| <i>CCI</i>   | −0.655                            | −0.011     | 0.496      | −7.002                            | −0.507     | 0.308      |
| <i>CICSI</i> | 1.024                             | 1.080      | 0.141      | −2.115                            | −0.364     | 0.359      |
| <i>CKBCI</i> | −4.774                            | −1.899     | 0.036      | −2.202                            | −0.237     | 0.407      |

Notes: Panels A and B show statistical estimates of the corresponding confidence indices before and during the COVID-19 pandemic, including  $R_{os}^2$ ,  $MSFE-adj$ , and  $p$ -value. \*\* represents significance at the 5% level.

Based on the relevant literature, we divided the samples into two parts using 23 January 2020, as the time point. Moreover, consistent with Section 4.1, the initial sample period remains 2005:01–2010:12, and the out-of-sample  $R_{os}^2$  values before and during the COVID-19 pandemic are compared. Panel A in Table 8 reports that both the *BCI* and *CLI* produced positive  $R_{os}^2$  statistics, reaching 2.465% and 3.314%, respectively, indicating that the *BCI* and *CLI* significantly enhanced the forecasting precision of stock returns before the outbreak of the COVID-19 pandemic. However, the other confidence indices have negative  $R_{os}^2$  values and exhibited poor forecasting potential for the stock market. Furthermore, compared with the results in Panel A, the predictability of returns for all five confidence indices is inferior after the outbreak of the pandemic, and significantly weaker than the pre-pandemic performance. Following the outbreak of the pandemic, a decline in business confidence led firms to expect a temporary drop in demand. This impending drop led to lower prices or an increase in inventories of unsold goods, both of which would reduce a firm's profitability (see, e.g., [51,52]).

## 5. The Assessment of Economic Value

Based on the work in [25,53], for investors with assets, the economic value of the confidence index can be evaluated using the certainty equivalent return (CER) gain and Sharpe ratio, which are obtained by optimally allocating assets to stocks and risk-free bonds.

$$w_t = \frac{1}{\gamma} \frac{\hat{R}_{t+1}}{\hat{\sigma}_{t+1}^2} \quad (10)$$

Here,  $w_t$  denotes the proportion of wealth allocated to risky assets by mean–variance investors at  $t + 1$  month, and  $\gamma$  denotes the degree of risk aversion. Then, the remaining

proportion,  $1-w_t$ , is allocated to risk-free bonds. Thus, the following equation expresses the actual portfolio return:

$$R_{t+1}^p = w_t R_{t+1} + R_{t+1}^f \quad (11)$$

In Equation (11), the risk-free returns are represented by  $R_{t+1}^f$ . The CER of the investment portfolio is given by Equation (12):

$$CER_p = \hat{\mu}_p - 0.5\gamma\hat{\sigma}_p^2 \quad (12)$$

where  $\hat{\mu}_p$  and  $\hat{\sigma}_p^2$  indicate the mean and variance for the out-of-sample evaluation period of  $q$  months. Similarly to [54], the CER gain is calculated using out-of-sample predictions of stock returns. Furthermore, we computed the Sharpe ratio of the investment portfolio, which is the quotient of the average portfolio return over the risk-free rate and the standard deviation of the portfolio return.

In Table 9, to adequately reflect the economic value of the confidence index to investors, we consider three levels of investors' mean–variance risk aversion. Panel A reports the test results for investors with risk aversion levels  $\gamma$  of one. The test results show that the CER gain from the BCI and CLI is larger, reaching 2.176% and 2.318% at a monthly frequency, respectively. The CER gain of the CICI is also positive, but slightly smaller, and the performance of other indices is relatively poor. Moreover, the Sharpe ratios (0.197 and 0.210) for the BCI and CLI substantially exceed that of the stock market (0.126). This supporting evidence shows that both the BCI and CLI generate greater economic value for investors. Compared to the results in Panels B and C, the estimations of economic value are almost identical to those in Panel A, indicating that, among the five confidence indices, the BCI and CLI lead to remarkable economic gains for investors relative to the other confidence indices. In addition, with the augmentation of risk aversion, the CER gain for investors gradually decreases; however, it is always positive for the BCI and CLI.

**Table 9.** The empirical results of the economic value test.

| Variables | Panel A: $\gamma = 1$ |              | Panel B: $\gamma = 3$ |              | Panel C: $\gamma = 5$ |              |
|-----------|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|
|           | CER Gain (%)          | Sharpe Ratio | CER Gain (%)          | Sharpe Ratio | CER Gain (%)          | Sharpe Ratio |
| BCI       | 2.176                 | 0.197        | 0.726                 | 0.212        | 0.436                 | 0.227        |
| CLI       | 2.318                 | 0.210        | 0.773                 | 0.222        | 0.464                 | 0.235        |
| CCI       | −0.236                | 0.071        | −0.079                | 0.088        | −0.047                | 0.106        |
| CICSI     | 0.227                 | 0.061        | 0.076                 | 0.087        | 0.046                 | 0.114        |
| CKBCI     | −1.325                | −0.133       | −0.442                | −0.106       | −0.265                | −0.078       |

Notes: Table 9 shows the economic value of the five confidence indices considering three degrees of risk aversion for investors. The CER gain and Sharpe ratio are two indicators used to ascertain economic value, calculated by [11]. Among the five confidence indices, the CKBCI ranges from 2012:01 to 2021:12 due to data limitations; the sample period for the other confidence indices is 2005:01–2022.12.

## 6. Robustness Test

### 6.1. The Effect of Confidence Indices on the Alternative Stock Market

In this section, we continue to demonstrate the predictive ability of the confidence index compared to alternative stock markets. As major financial markets, the Shanghai and Shenzhen stock markets play an important role in China's financial sector. Therefore, we empirically tested the prediction accuracy of the five confidence indices using the stock returns of the above two markets.

Table 10 evaluates the predictive ability of the confidence index compared to other stock markets across three aspects: in-sample, out-of-sample, and economic value tests. In

Panel A, the BCI, CLI, and CICS I show significant in-sample prediction effectiveness, with  $R^2$  statistics of 5.192%, 2.507%, and 1.916%, respectively; by contrast, the CCI and CKBCI perform unsatisfactorily, with results similar to those in Table 5. Moreover, in the out-of-sample results, the predictability of the BCI, CLI, and CICS I for stock returns remains at a minimum 10% significance level, while other indices perform poorly. Again, from the evidence of economic value tests, both the business confidence index and the composite leading index result in considerable economic gain for investors, in accordance with the estimations in Table 9.

For Panel B in Table 10, in the Shenzhen stock market, the performance of the BCI and CLI is excellent in forecasting stock returns in both in- and out-of-sample tests. Further, compared to the corresponding prediction statistics in Panels A and B, we discovered that the estimation statistics for the Shenzhen stock market are marginally higher than those for the Shanghai stock market. This evidence suggests that the Shenzhen stock market has more small- and medium-cap corporations and is more susceptible to the confidence index than the Shanghai stock market, which has large-cap corporations. This finding is consistent with the results of Han and Li [22]. Table 10 also shows that the forecasting accuracy of the aforementioned confidence indices passes the robustness test for alternative stock markets.

**Table 10.** Forecasting accuracy across different stock markets.

| Variables                      | In-Sample |                | Out-of-Sample |                |                  | Economic Value |              |
|--------------------------------|-----------|----------------|---------------|----------------|------------------|----------------|--------------|
|                                | $\beta$   | <i>t</i> -Stat | $R^2(\%)$     | $R^2_{os}(\%)$ | <i>MSFE</i> -adj | CER Gain (%)   | Sharpe Ratio |
| Panel A: Shanghai stock market |           |                |               |                |                  |                |              |
| BCI                            | 1.811 **  | 2.717          | 5.192         | 2.812 ***      | 2.799            | 2.103          | 0.200        |
| CLI                            | 1.258 *   | 1.889          | 2.507         | 2.411 **       | 2.245            | 2.070          | 0.207        |
| CCI                            | 0.126     | 0.350          | 0.025         | −0.669         | 1.595            | −1.942         | 0.109        |
| CICS I                         | −1.100 ** | −2.462         | 1.916         | 1.195 *        | 1.331            | 0.183          | 0.064        |
| CKBCI                          | −0.481    | −1.084         | 0.645         | −3.420         | −0.955           | −0.631         | 0.069        |
| Panel B: Shenzhen stock market |           |                |               |                |                  |                |              |
| BCI                            | 1.977 **  | 2.568          | 4.840         | 3.099 ***      | 2.861            | 2.006          | 0.186        |
| CLI                            | 1.614 **  | 2.264          | 3.228         | 3.177 **       | 1.955            | 2.262          | 0.216        |
| CCI                            | 0.169     | 0.346          | 0.035         | −1.281         | 0.465            | −1.593         | 0.070        |
| CICS I                         | −1.245 ** | −2.542         | 1.921         | 0.270          | 0.699            | −0.094         | 0.052        |
| CKBCI                          | −0.585    | −1.017         | 0.611         | −8.069         | −0.754           | −2.000         | −0.103       |

Notes: This table reports the forecasting accuracy of five confidence indices across different stock markets, evaluated based on in-sample, out-of-sample, and economic value. Panel A shows the estimated value of confidence indices for the Shanghai stock market. Panel B reports the predicted performance of the corresponding indices for the Shenzhen stock market. \*, \*\*, or \*\*\* represent significance at the 10%, 5%, and 1% levels, respectively. Among the five confidence indices, the CKBCI only ranges from 2012:01 to 2021:12 due to data limitations; the sample period for the other confidence indices is 2005:01–2022.12.

## 6.2. The Predictability of Alternative Forecasting Periods

According to the examined studies [55,56], different prediction evaluation periods may result in inconsistent prediction results; thus, in this section, we check the return predictability of the confidence indices based on the different initial sample periods. In Table 11, Panels A and B show the out-of-sample prediction results with initial sample lengths of 120 and 144 months, respectively.

From the results in Panel A, when considering an initial sample period of 120 months, only the BCI, CLI, and CICS I, among the five confidence indices, produce significant  $R^2_{OS}$  values, implying that these indices outperform the average historical results of forecasting stock returns in the Chinese market. Furthermore, in the last two columns, estimates of

different economic cycles show that the confidence indices are more predictive of stock returns in the bear stage than the bull stage, similar to the findings in Table 7.

The estimation results in Panel B generally agree with the evidence in Panel A. The business confidence index, composite leading index, and investor sentiment index all have a significant effect on the next month's stock returns, indicating that these three indices provide more market information than the CCI and CKBCI. The prediction results across different economic cycles are also consistent with the findings in Table 7. This evidence suggests that the forecast performance of the confidence indices is robust across different assessment periods. BCI is conceptually and empirically separable from market investor sentiment: investor sentiment reflects retail/institutional traders' speculative biases and mispricing tendencies. In contrast, the BCI measures rational managerial investment expectations rooted in firm fundamentals.

**Table 11.** The estimation results of alternative forecasting periods.

| Variables                                    | $R_{2OS}$ (%) | $MSFE_{adj}$ | $p$ -Value | $R_{2OS,bull}$ (%) | $R_{2OS,bear}$ (%) |
|----------------------------------------------|---------------|--------------|------------|--------------------|--------------------|
| Panel A: Initial sample period of 120 months |               |              |            |                    |                    |
| BCI                                          | 2.451 ***     | 2.610        | 0.005      | 0.347              | 3.714              |
| CLI                                          | 3.581 **      | 2.214        | 0.015      | 0.452              | 5.501              |
| CCI                                          | 0.246         | 0.665        | 0.254      | −3.342             | 3.076              |
| CICSI                                        | 1.296 *       | 1.495        | 0.070      | −5.131             | 6.218              |
| CKBCI                                        | −2.566        | −1.290       | 0.102      | −2.935             | −2.310             |
| Panel B: Initial sample period of 144 months |               |              |            |                    |                    |
| BCI                                          | 4.899 ***     | 2.466        | 0.008      | 0.817              | 11.931             |
| CLI                                          | 3.343 **      | 1.880        | 0.032      | −1.598             | 11.856             |
| CCI                                          | 2.459         | 1.078        | 0.142      | −5.950             | 16.945             |
| CICSI                                        | 2.875 *       | 1.593        | 0.058      | −3.170             | 13.288             |
| CKBCI                                        | −2.204        | −2.467       | 0.122      | −1.667             | −2.452             |

Notes: This table shows the estimated results of the confidence indices across different forecast periods. Excluding the CKBCI, the initial sample lengths of the remaining four confidence indices shown in Panels A and B are 120 and 144 months, respectively. Due to data limitations, the initial sample lengths of the CKBCI in Panels A and B are 84 and 96 months. \*, \*\*, or \*\*\* represent significance at the 10%, 5%, and 1% levels, respectively.

## 7. Conclusions

In this study, we investigated the return prediction capacity of five confidence indices: the business confidence index (BCI), composite leading index (CLI), consumer confidence index (CCI), composite investor sentiment index (CICSI), and Cheung Kong Graduate School of Business conditions index (CKBCI). The in-sample and out-of-sample results suggest that the BCI has the best forecasting ability, followed by the CLI and CICSI, while the consumer confidence index and Cheung Kong Graduate School of Business conditions index exhibit unsatisfactory performance.

More specifically, a one-standard-deviation improvement in the BCI leads to a 1.867% increase in stock returns, and the in-sample and out-of-sample  $R^2$  (or  $R_{OS}^2$ ) statistics reach 5.285% and 3.217%, respectively. In addition, the predictability of the BCI is persistent and pronounced for both short and medium horizons when considering its forecasting effect across different horizons. Furthermore, we found that the BCI and CICSI provide complementary information on forecasting stock returns. Business confidence mainly represents corporations' future expectations, especially regarding the real economy, while investor sentiment measures whether the stock market is bearish or bullish

from the perspective of market investors. Therefore, the BCI and CICS I substantially impact the stock market from different perspectives, and the market information they provide is complementary. In particular, during the COVID-19 pandemic, the predictive power of confidence indices for stock market return noticeably declined. At the same time, compared to the forecasting performance during bull market periods, the predictability of the confidence indices is better during bear market periods.

In addition, the BCI and CLI result in sizable economic gains for mean–variance investors. The robustness test also shows that the empirical findings of this study pass the robustness assessment. The business information and composite leading indices have unique implications for pricing. Investors can adjust their investment strategies according to business confidence and comprehensive leading indicators, optimize their portfolios, and obtain greater returns. Policymakers can formulate effective policies based on the overall business environment, providing policy assurances for the long-term and stable development of financial markets.

**Author Contributions:** Methodology, Y.X. and A.S.; software, Y.X.; formal analysis, Y.X.; resources, A.S.; data analysis, Y.X.; writing—original draft preparation, Y.X. and A.S.; writing—review and editing, Y.X. and A.S.; supervision, Y.X.; project administration, Y.X. and A.S.; funding acquisition, Y.X. and A.S. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by the Soft Science Research Project of the Gansu Provincial Science and Technology Department (25JRZA099).

**Institutional Review Board Statement:** No human participants were recruited, no interventions or interactions were performed, and no private or sensitive information was collected. All data processing was conducted on anonymized and de-identified data, and the study poses minimal risk to individuals. The study involves only non-interventional analysis of publicly available data, which is exempt from formal ethics committee/IRB review under relevant guidelines. We confirm that no additional ethics approval is required for this research.

**Informed Consent Statement:** Informed consent from individual users was waived for the following reasons: (1) the data is publicly available and users have no reasonable expectation of privacy in these public posts; (2) the study poses no more than minimal risk to participants; (3) it is technically impracticable to obtain individual consent from all users of the large dataset; and (4) all data has been irreversibly anonymized, so no individual can be identified from the published results.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author. The BCI and CLI employed in this study are derived from the publicly available OECD database and are freely accessible to other researchers. The constructed comprehensive CICS I, however, relies on proprietary data from enterprise-level surveys. The raw data supporting the conclusions of this article will be made available by the authors on request.

**Acknowledgments:** We would like to express his gratitude to the graduate students and team in the fintech field for providing technical support for this research.

**Conflicts of Interest:** The authors declare no conflicts of interest.

## Abbreviations

The following abbreviations are used in this manuscript:

|        |                                         |
|--------|-----------------------------------------|
| BCI    | Business Confidence Index               |
| CLI    | Composite Leading Economic Index        |
| CKBCI  | Cheung Kong Graduate School of Business |
| CCI    | Consumer Confidence Index               |
| CICS I | Composite Investor Sentiment Index      |

## Appendix A

**Table A1.** The estimated results of the confidence index for control variables.

| Variables              | The Estimation Results Including the Control Variables |          |         |          |          |
|------------------------|--------------------------------------------------------|----------|---------|----------|----------|
| BCI                    | 1.873 ***                                              |          |         |          |          |
|                        | [3.417]                                                |          |         |          |          |
| CLI                    |                                                        | 1.390 ** |         |          |          |
|                        |                                                        | [2.493]  |         |          |          |
| CCI                    |                                                        |          | 0.305   |          |          |
|                        |                                                        |          | [0.529] |          |          |
| CICSI                  |                                                        |          |         | −1.239   |          |
|                        |                                                        |          |         | [−1.267] |          |
| CKBCI                  |                                                        |          |         |          | −0.802   |
|                        |                                                        |          |         |          | [−1.281] |
| Controls               | YES                                                    | YES      | YES     | YES      | YES      |
| R <sup>2</sup> (%)     | 6.673                                                  | 4.398    | 0.962   | 2.124    | 1.503    |
| Adj.R <sup>2</sup> (%) | 5.204                                                  | 3.002    | −0.488  | 0.581    | −0.976   |

Notes: This table presents the estimated results of BCI and alternative confidence indices after including control variables. The controls include GDP growth and industrial production growth. \*\* and \*\*\* indicate significance at the 5% and 1% levels, respectively. The sample period is 2005:01–2022:12.

**Table A2.** Out-of-sample estimation based on the Monte Carlo approach.

| Variables | R <sub>Os</sub> <sup>2</sup> (%) | MSFE-adj | p-Value | R <sub>Os<sup>bull</sup></sub> <sup>2</sup> (%) | R <sub>Os<sup>bear</sup></sub> <sup>2</sup> (%) |
|-----------|----------------------------------|----------|---------|-------------------------------------------------|-------------------------------------------------|
| BCI       | 3.005 ***                        | 2.885    | 0.003   | −0.625                                          | 5.362                                           |
| CLI       | 0.685                            | 0.709    | 0.246   | −0.884                                          | 2.867                                           |
| CCI       | 0.216                            | 0.218    | 0.416   | −3.619                                          | 3.838                                           |
| CICSI     | 0.235                            | 0.237    | 0.401   | −5.931                                          | 7.836                                           |
| CKBCI     | −3.985                           | 1.037    | 0.014   | −4.782                                          | −3.583                                          |

Notes: This table presents the out-of-sample prediction test for BCI and alternative confidence indices using the Monte Carlo approach. \*\*\* indicates significance at the 1% level. The sample period is 2005:01–2022:12.

## References

- Wang, W.; Su, C.; Duxbury, D. Investor sentiment and stock returns: Global evidence. *J. Empir. Financ.* **2021**, *63*, 365–391.
- Hampson, D.P.; Gong, S.; Xie, Y. How consumer confidence affects price conscious behavior: The roles of financial vulnerability and locus of control. *J. Bus. Res.* **2021**, *132*, 693–704.
- Møller, S.V.; Nørholm, H.; Rangvid, J. Consumer confidence or the business cycle: What matters more for European expected returns? *J. Empir. Financ.* **2014**, *28*, 230–248.
- Xu, Y.; Wang, J.; Chen, Z.; Liang, C. Sentiment indices and stock returns: Evidence from China. *Int. J. Financ. Econ.* **2023**, *28*, 1063–1080.
- Huang, D.; Jiang, F.; Tu, J.; Zhou, G. Investor sentiment aligned: A powerful predictor of stock returns. *Rev. Financ. Stud.* **2015**, *28*, 791–837.
- Long, J.B.D.; Shleifer, A.; Summers, L.H.; Waldmann, R.J. Noise trader risk in financial markets. *J. Political Econ.* **1990**, *98*, 703–738.
- Li, C.; Zeng, H.; Mo, H. Sentiment and the Chinese stock return: The case of the Russia-Ukraine conflict. *Int. Rev. Econ. Financ.* **2026**, *109*, 105477.
- Lu, H.; Wang, X. Climate change news sensitivity and expected stock returns: Evidence from China. *Financ. Res. Lett.* **2025**, *81*, 107497.
- García, D. Sentiment during recessions. *J. Financ.* **2013**, *68*, 1267–1300.

10. Xue, J.; Wang, B.; Peng, X.-Y.; Lau, C.K. Chinese stock return predictability: A time–frequency and shrinkage modeling approach. *Pac.-Basin Financ. J.* **2026**, *99*, 103201.
11. Campbell, J.Y.; Thompson, S.B. Predicting excess stock returns out of sample: Can anything beat the historical average? *Rev. Financ. Stud.* **2008**, *21*, 1509–1531.
12. Huang, D.; Li, J.; Wang, L. Are disagreements agreeable? Evidence from information aggregation. *J. Financ. Econ.* **2021**, *141*, 83–101.
13. Fisher, K.; Statman, M. Consumer confidence and stock returns. *J. Portf. Manag.* **2003**, *30*, 115–127.
14. Chen, S.-S. Lack of consumer confidence and stock returns. *J. Empir. Financ.* **2011**, *18*, 225–236.
15. Zhang, H.; Xiong, X.; Guo, B. The stock return predictability of treasury bond yield in China. *J. Empir. Financ.* **2025**, *84*, 101654.
16. Ng, Y.-K. Business confidence and depression prevention: A mesoeconomic perspective. *Am. Econ. Rev.* **1992**, *82*, 365–371.
17. Atukeren, E.; Korkmaz, T.; Çevik, E.İ. Spillovers between business confidence and stock returns in Greece, Italy, Portugal, and Spain. *Int. J. Financ. Econ.* **2013**, *18*, 205–215.
18. Wang, J.; Wang, Z.; Wu, K. Forecasting stock market return with anomalies: Evidence from China. *Int. J. Forecast.* **2025**, *41*, 1278–1295.
19. Salhin, A.; Sherif, M.; Jones, E. Managerial sentiment, consumer confidence and sector returns. *Int. Rev. Financ. Anal.* **2016**, *47*, 24–38.
20. Yousuf, Z.; Marozva, G. Business confidence index (BCI) and share return volatility nexus: Sectorial empirical evidence. *J. Risk Financ. Manag.* **2025**, *18*, 627.
21. Long, H.; Zaremba, A.; Zhou, W.; Bouri, E. Macroeconomics matter: Leading economic indicators and the cross-section of global stock returns. *J. Financ. Mark.* **2022**, *61*, 100736.
22. Han, X.; Li, Y. Can investor sentiment be a momentum time-series predictor? Evidence from China. *J. Empir. Financ.* **2017**, *42*, 212–239.
23. Sul, H.K.; Dennis, A.R.; Yuan, L. Trading on twitter: Using social media sentiment to predict stock returns. *Decis. Sci.* **2017**, *48*, 454–488.
24. Xu, Y.; Liang, C.; Li, Y.; Huynh, T. News sentiment and stock return: Evidence from managers' news coverages. *Financ. Res. Lett.* **2022**, *48*, 102959.
25. Huang, D.; Jiang, F.; Li, K.; Tong, G.; Zhou, G. Scaled PCA: A new approach to dimension reduction. *Manag. Sci.* **2022**, *68*, 1678–1695.
26. Park, C.-Y.; Mercado, R.V. Determinants of financial stress in emerging market economies. *J. Bank. Financ.* **2014**, *45*, 199–224.
27. Ma, F.; Liao, Y.; Zhang, Y.; Cao, Y. Harnessing jump component for crude oil volatility forecasting in the presence of extreme shocks. *J. Empir. Financ.* **2019**, *52*, 40–55.
28. Amaya, D.; Christoffersen, P.; Jacobs, K.; Vasquez, A. Does realized skewness predict the cross-section of equity returns? *J. Financ. Econ.* **2015**, *118*, 135–167.
29. Welch, I.; Goyal, A. A comprehensive look at the empirical performance of equity premium prediction. *Rev. Financ. Stud.* **2008**, *21*, 1455–1508.
30. Wang, Y.; Liu, L.; Ma, F.; Diao, X. Momentum of return predictability. *J. Empir. Financ.* **2018**, *45*, 141–156.
31. Fama, E.F.; French, K.R. Dividend yields and expected stock returns. *J. Financ. Econ.* **1988**, *22*, 3–25.
32. Fama, E.F.; Schwert, G.W. Asset returns and inflation. *J. Financ. Econ.* **1977**, *5*, 115–146.
33. Li, Y.; Huo, J.; Xu, Y.; Liang, C. Belief-based momentum indicator and stock market return predictability. *Res. Int. Bus. Financ.* **2023**, *64*, 101825.
34. Taylor, K.; McNabb, R. Business cycles and the role of confidence: Evidence for Europe. *Oxf. Bull. Econ. Stat.* **2007**, *69*, 185–208.
35. Liang, C.; Xu, Y.; Wang, J.; Yang, M. Whether dimensionality reduction techniques can improve the ability of sentiment proxies to predict stock market returns. *Int. Rev. Financ. Anal.* **2022**, *82*, 102169.
36. Yi, Z.; Mao, N. Measurement study of China's stock market investor sentiment-construction of CICI. *Financ. Res.* **2009**, *11*, 174–184.
37. Jiang, F.; Lee, J.; Martin, X.; Zhou, G. Manager sentiment and stock returns. *J. Financ. Econ.* **2019**, *132*, 126–149.
38. Newey, W.K.; West, K.D. A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica* **1987**, *55*, 703–708.
39. Darling, P.G. A surrogate measure of business confidence and its relation to stock prices. *J. Financ.* **1955**, *10*, 442–458.
40. Zhang, J.; Zeng, Q.; Bouri, E.; Gozgor, G. Newly-constructed Chinese geopolitical risk index and trade stock returns. *Res. Int. Bus. Financ.* **2025**, *74*, 102705.

41. Xu, Y.; Liang, C.; Wang, J. Financial stress and returns predictability: Fresh evidence from China. *Pac.-Basin Financ. J.* **2023**, *78*, 101980.
42. Jiang, F.; Tu, J.; Rapach, D.; Strauss, J.; Zhou, G. How predictable is the Chinese stock market? *China J. Financ. Res.* **2011**, *9*, 107–121.
43. Ali, F.; He, R.; Jiang, Y. Size, value and business cycle variables. The three-factor model and future economic growth: Evidence from an emerging market. *Economies* **2018**, *6*, 14.
44. Huang, D.; Jiang, F.; Tu, J.; Zhou, G. Forecasting stock returns in good and bad times the role of market states. In Proceedings of the 27th Australasian Finance and Banking Conference, Sydney, Australia, 16–18 December 2014.
45. Xu, Y.; Liang, C. Does extreme climate concern drive equity premiums? Evidence from China. *Humanit. Soc. Sci. Commun.* **2024**, *11*, 1187.
46. Rapach, D.E.; Strauss, J.K.; Zhou, G. Out-of-sample equity premium prediction: Combination forecasts and links to the real economy. *Rev. Financ. Stud.* **2009**, *23*, 821–862.
47. Wang, W.; Su, C.; Duxbury, D. The conditional impact of investor sentiment in global stock markets: A two-channel examination. *J. Bank. Financ.* **2022**, *138*, 106458.
48. Zhang, Y.; Wang, Y. Forecasting crude oil futures market returns: A principal component analysis combination approach. *Int. J. Forecast.* **2022**, *39*, 659–673.
49. Liang, C.; Li, Y.; Ma, F.; Wei, Y. Global equity market volatilities forecasting: A comparison of leverage effects, jumps, and overnight information. *Int. Rev. Financ. Anal.* **2021**, *75*, 101750.
50. Pagan, A.R.; Sossounov, K.A. A simple framework for analyzing bull and bear markets. *J. Appl. Econom.* **2003**, *18*, 23–46.
51. Ambrocio, G. Euro-area business confidence and COVID-19. *Appl. Econ.* **2022**, *54*, 4915–4929.
52. Teresiene, D.; Keliuotyte-Staniulieniene, G.; Liao, Y.; Kanapickiene, R.; Pu, R.; Hu, S.; Yue, X.-G. The impact of the COVID-19 pandemic on consumer and business confidence indicators. *J. Risk Financ. Manag.* **2021**, *14*, 159.
53. Ma, F.; Lu, X.; Liu, J.; Huang, D. Macroeconomic attention and stock market return predictability. *J. Int. Financ. Mark. Inst. Money* **2022**, *79*, 101603.
54. Zhang, Y.; Wei, Y.; Ma, F.; Yi, Y. Economic constraints and stock return predictability: A new approach. *Int. Rev. Financ. Anal.* **2019**, *63*, 1–9.
55. Engle, R.F.; Ghysels, E.; Sohn, B. Stock market volatility and macroeconomic fundamentals. *Rev. Econ. Stat.* **2013**, *95*, 776–797.
56. Liang, C.; Xu, Y.; Chen, Z.; Li, X. Forecasting China's stock market volatility with shrinkage method: Can adaptive lasso select stronger predictors from numerous predictors? *Int. J. Financ. Econ.* **2022**, *28*, 3689–3699.

**Disclaimer/Publisher's Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.