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Does the Centrual Economic Work Conference (CEWC) affect the stock market?

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Abstract

Purpose – This paper focuses on the orientation of the economy expressed in the communication of the Central Economic Work Conference (CEWC) of China and its relation with the stock market. This study seeks to explore which orientation of the economy may have a stronger impact on the rise of the stock market. It proposes words connoting orientation of the economy (WOE) that is closely related to the stock market, and different WOE has different impacts on the stock market in terms of intensity. The study aims to provide investors with better investment strategies by identifying the stronger developmental WOE.

Design/methodology/approach – The paper opted for an exploratory study using the textual analysis approach, based on a corpus of 28 CEWC communications spanning from 1994 to 2021. The raw corpus amounted to 50,754 words in total that are treated with noise reduction method and record an effective corpus of 39,591.

Findings – The paper provides empirical insights into the close relationship of the WOE of the CEWC to the stock market, and different WOE has different impacts on the stock market in terms of intensity. It suggests that WOE connoting development may forecast a rising stock market if it is nearly 40% higher than the other two WOEs by impact index.

Research limitations/implications – As WOE is only proven in the CEWC, this paper has its limitations in the scope of samples. It is necessary to apply WOE to more Central Bank communication (CBC) and countries. It is desirable to apply the Gunning–Fog index.

Practical implications – The paper includes implications for investors to read out the orientation of the economy and the degree of different WOEs. Investors are keener to know "what" degree of the CEWC leads to

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the rise/fall of the stock market. The impact index can be an indicator of a tendency of the stock market, which upgrades the rationality of investment decisions.
Social implications – This paper fulfills words connoting the orientation of economy as an identified linguistic feature, which the impact of CEWC on stockmarket can be measured.
Originality/value – Previous academic research studies mostly focus on the impact on stock market from the language features of CBC, rather than that from the more influential body, CEWC communication. This study seeks to provide the relationship of CEWC communication and the time length of the impact on the stock prices.

Keywords Central bank, Stock market, CEWC, Orientation of economy
Paper type Research paper

1. Introduction

Central Bank communications (CBCs) are essential statements of monetary policy that aim to explain and clarify the behaviors of the Central Bank(CB) (Blinder *et al.*, 2008). The rhetoric of CBC (Guo *et al.*, 2021) and relevant statements or speeches of the CB, like the Forward Statements of CB (Möller and Reichman, 2021), etc. can influence the stock market (Gürkaynak *et al.*, 2005; Sack and Kohn, 2003; Blinder *et al.*, 2008). These researches are made on the basis of the CBC from the monetary perspective. However, China is remarkably different compared to the USA and the EU. The central economic work conference (CEWC), the highest policy-making body of the next year's economic activities, usually provides the most authoritative and influential guidance by holistically sizing up the monetary, industrial and external factors. Undoubtedly CEWC is superior to the People's Central Bank of China (PBOC). Therefore, it is necessary to explore the role of CEWC in the financial market.

Previous studies on CBC can be summarized in two aspects. (1) the majority of literature relating to CBC highlight the role of CBC on the financial market, for example, the ups and downs of the financial market under FOMC (O'Brien, 1981; Hayo *et al.*, 2012; Mirkov *et al.*, 2019; Jung and Kuehl, 2021), and communication efficiency from European Central Bank (ECB) (Möller and Reichman, 2021) and PBOC (Guo *et al.*, 2021; Wang and Liu, 2016). (2) Textual analysis of CBC is usually devoted to one specific financial aspect, for example, the study of similarities of semantic words of PBOC and interest rates (Guo *et al.*, 2021), the dictionary of constraint, tone and uncertainty words of the forward guidance of ECB (Möller and Reichman, 2021), the inflation-related words of PBOC (Lin and Zhao, 2015) and informative language cues of the Federal Open Market Committee (FOMC) (O'Brien, 1981). In general, these studies rely on semantic words as a reliable approach to forecast the impending economic impact, while few prove the effectiveness of this linguistic analysis approach in the real market except Möller and Reichman (2021), who examined the impact of CBC on the stock market. However, to date, research on communications of CEWC in the context of the stock market is still very rare. In this regard, this research makes a contribution to the present literature in that it works out which orientation of the economy has stronger impact on the stock market in China.

As for the influence of the CB on the stock market, a variety of genres relating to the CB come to sight first. Jung and Kuehl (2021) found that the browsing traces of investors, usually the theme or concepts on the website of the ECB, in the form of text, indicate the volatility of stock price in the context of inflation. The way to express interest rates may pose influence on China's stock market by the level of stress and emphasis (Li *et al.*, 2019). The oral Q&As of the ECB have an immediate but short impact on the EU stock market (Möller and Reichmann, 2021). The informal verbal statement made by the Chairman of PBOC may influence the stock price (Zou *et al.*, 2020). Though these researches discuss the impact of CBC from various genres, they do not point out the orientation of the economy. The orientation of the economy is referred to as the forecast of the trend of the economy, which focuses on economic development and fall and standstill (Lunsford, 2020). In this study, we apply python to the linguistic approach, to sort out the words connoting orientation of economy (WOE) in CEWC of China. In particular, we address the following questions.

(1) Can WOE signal the orientation of economy in the CEWC?

(2) Which WOE is in line of the ups and downs of the stock market in China?

The structure of this study is organized as followed. We first expound on the importance and contribution of this study in the Introduction section. Then we look back at the literature to explain the impact of CBC from the language perspective. In the Method section, we explicitly expound the method of corpus building and the method to extract WOE in CEWC. In the Results section, we demonstrate the stock market in light of the WOE. Then we found the correlation between the intensity of WOE words and the stock market. In the Conclusion section, we summarize the findings and point out the practical implications to the stock market.

2. Literature review

2.1 CBC and stock market

The information expressed in the texts of CBC provides useful cues of information, which may benefit the investors if appropriately interpreted. Beutel *et al.* (2021) argued that an individual's behavior to invest is stable when the expectation arising from language features in the communication remains unchanged. Language features like word intensity can be used to predict future market movements (Möller and Reichman, 2021). In addition, the content of the CBC has also drawn increasing attention from academia. Based on the content of a popular *Wall Street Journal* column, Tetlock (2007) stated that the content of financial language can influence the stock market movements via investor psychology and sociology. Further, the content is classified by discourse types. For example, the market is very likely to process the content of language "shades" of ECB forwarding guidance (Möller and Reichman, 2021). In a nutshell, the texts of CBC can solicit "a simple and targeted piece of information leading to a stronger response" (Beutel *et al.*, 2021, p. 2). Despite the genre, scholars furthered the impact of CBC on the financial market by referencing to the proxies of semantic words, and the similarities of semantic words. The number of word speeches used in CBC has a positive impact on stock market volatility (Picault and Renault, 2017). Guo *et al.* (2021) apply semantic similarity to measure the documents of PBOC, and claim that the higher the similarities are, the more volatile the RMB exchange rates are. Lin *et al.* (2019) build the communication index based on the speeches of the President of PBOC. The impact of ECB forwarding guidance on the intra-day stock price is related to certain types of words (Möller and Reichman, 2021). The browsing behavior of ECB communication is dependent on the keywords obtained from Google Analytics (Jung and Kuehl, 2021). Sentimental words that may affect the investors' attitudes and diagnosis have been given special attention recently. Via the expectation of audiences and individual behavior, the CBC affects the financial market by exerting an impact on the expectation of the individual investors' behavior, which is dependent on the information obtained from the text of CBC (Belke and Beckmann, 2015; Guo *et al.*, 2021; Nicolò, 2020).

The extant academia focuses on the impact of CBC on many sub-topics of finance, while the stock market is given increasing attention (Jung and Kuehl, 2021). We summarize the recent researches on the impact of CBC on the financial market in Table 1. It can be noted that sub-financial topics of CBC have been singled out to demonstrate the impact of CBC on stock market. For example, the exchange rate changes (Conrad and Lamla, 2010; Mirkov *et al.*, 2019), inflation (Nicolò, 2020) and interest rate (Brubakk *et al.*, 2021) and bonds (Zhang and Shen, 2021). One of the important features of these research studies lies in that semantics of CBC are given special attention. In the analysis of the ECB documents, Jung and Kuehl (2021) discovered that the website's attention to inflation, which is measured by the keywords, influences the stock price in EU stock market. Möller and Reichman (2021) mined the grammatical and syntactical cues that distinguish the general tone, uncertainty and constraint expressed in the ECB press conference. The distinct way to express the interest

Table 1.
The literature of CBC researches

Authors	Year	Subject	Findings	Market	Research method
Zhang and Hu	2013	Central bank communication(PBOC)	Reduce stock price volatility	Stock Price	SVAR Model
Wang and Liu	2016	Central bank communication(PBOC)	Short-term financial markets	Interest Bond Stock FX	EGARCH Model
Guo *et al.*	2021	PBOC's communication on RMB volatility	Time-varying and dependent	RMB exchange rate	Textual analysis Semantic similarity
Zhang and Shen	2021	Central bank communication = PBOC	Expectation management about inflation	Inter-bank treasury yield rate	Regression distribution lag model; EGARCH
Jung and Kuehl	2021	ECB	Website attention influences euro area inflation expectations	Stock price	Textual analysis
Möller and Reichmann	2021	ECB	Q&A sessions significantly affect euro area stock returns	Stock price	Textual analysis
Li *et al.*	2019	PBOC	Relating to interest rates	Stock	EGARCH
Zou *et al.*	2020	PBOC	CB communication	Stock	Event approach
Beutel *et al.*	2021	PBOC	CB communication	exchange rates	Textual analysis

rate can be interpreted as a sign of future actions of the CB, which eventually poses influences on the Chinese stock market (Li *et al.*, 2019). But investors' experience is when the orientation of the economy posts more on development and optimism, the stock market usually responds with a rising trend. However, the orientation of the economy of the CBC is not studied yet. Therefore, this present study makes a contribution in that it attempts to figure out the orientation of the economy by the approach of integrating the economic and financial, and industrial words instead of the groundless word lists from the CBC.

Among the different genres of CBC, verbal statements made by the Chairman of the CB are increasingly gaining attention regarding the attitude, sentiment, tones and topics. The verbal statements made by the Chairman of the PBOC in interviews and speeches have been given special attention since the interpretation is usually found to be in line with the ups and downs of the stock price (Zou *et al.*, 2020). Hayo *et al.* (2012) found that the verbal communication of the Bank of Canada seems to exert a more important impact on the stock market. Born *et al.* (2014) analyzed written communication (based on financial stability reports) and oral communication (based on public speeches and interviews by monetary authority officials) over the past 14 years in 37 countries, pointing out that verbal communication effect is usually short-termed. Moreover, some scholars who are not satisfied with the general features of verbal communication began to look further into the crucial language elements. One important feature of these research studies is that attitudes and sentiments have been accommodated to increase the forecast accuracy. But these studies fail to point out the impact of WOE on the stock market. In this study, we align the WOE with the stock market performance and calculate the correlation of WOE with the stock market.

2.2 Pygmalion effect

The Pygmalion effect refers to what one person expects from another can come to serve as a self-fulfilling prophecy. This concept of the Pygmalion effect is proposed by Harvard's psychologist Rosenthal (2002) who revealed a potential reinforcement of self-fulfilling for every child in school. Such effect of interpersonal expectations is usually confined to the field of education (Pintrich and Schunk, 2002; Chang, 2011; Rosenthal, 2002), indicating that students or employees eventually turn to live up to what is expected of them and tend to do better as if they are capable of success (Livingston, 2003).

The Pygmalion effect is found to be valid not only in education but also in various fields. Mohammed Nadeem (2017, p. 2) stated that the Pygmalion effect "applies to all kinds of settings, from sports teams to the military to the corporate workplace." In the article called Pygmalion effect, Loftus (1995) was one of the earliest scholars to associate the Pygmalion effect with the finance and business fields. He clearly pointed out that it is applicable in business mentoring and the banking industry. He argued that the Pygmalion effect is usually shown in the form of bank failure where a bank that is solvent may be faced with a crisis if a rumor of bankruptcy spreads. Livingston (2003) identified the influence of the Pygmalion effect on the field of management, with which employers and employees may improve their relations. The effectiveness of an organization is congruent with the rise of leaders' expectations (Ambady and Rosenthal, 1992). In terms of legal affairs, it is noted that juries' verdicts of guilty made by the jury are likely to increase with the fact that the assigned judges hinted at the guilty of the defendant (Babad, 1992). Nadeem (2017) claimed that the rise of Bitcoin is primarily due to the Pygmalion effect.

According to Rosenthal (2002), the Pygmalion effect is usually explained by the four-factor theory, which includes both non-verbal and verbal forms of communication. The four factors are (1) climate: in climate, a context is set up for the communication, which may be a sentiment, tone and the effectiveness level of communication; (2) feedback: it means such verbal clues about their performance, acknowledgment, and weakened criticism. (3) Input:

speakers provide a reservoir of materials, written or verbal for the receivers to help them digest and become potentially ready for the expectations and (4) output: this refers to the output of receivers, who may bring forth their ideas, uncertainty and doubts through interviews, and the Q&A in the press conference (Loftus, 1995).

We assume that the CBC is largely the result of the Pygmalion effect if we consider the four-factor theory and the current research. The media of CB communication, the press conference (Möller and Reichman, 2021), the written document (Born *et al.*, 2014; Guo *et al.*, 2021) and the verbal speeches by the President of CB (Zou *et al.*, 2020) are related to one of the four factors. In a nutshell, the scope, subject and materials of these studies explicitly show that the Pygmalion effect can be used to explain the impact of CB communication on investors and audiences. In this regard, we make a contribution to the literature by explaining the effect of CEWC from the mechanism of the Pygmalion effect.

3. Method

3.1 Overview of the method

We select 28 CEWC communications from the People's Daily, which is the authorized agency to publish the CEWC text in full text. Our 28 texts span from 1994 to 2021 because 1994 is the first year to see the change from the "National Economic Work Conference" to the "Central Economic Work Conference (CEWC)". Based on the 28 texts, we build a corpus that amount to 50,754 words in total. In order to find the WOE of CEWC, we apply textual analysis, which is shown in Figure 1.

Figure 1 shows the overall process from pre-processing to WOE. In the pre-processing part, we delete the attendant's names, the editor's reviews and published dates, etc. Then we run the software of Python with the "Jieba" word segmentation dictionary, a third-party library usually used for Chinese word segmentation. As there is a high likelihood of mistakenly separating some proper nouns of CEWC out with the tool of "Jieba", for example, mistaking "经济工作(economic work)" for two separate words, "经济(economic)" and "工作(work)", we manually modify the user dictionary according to the expression practices of CEWC communication. And the size of the dictionary is about 1,000 phrases in total. Because the majority of textual analysis studies focus on the linguistic content (Bodnaruk *et al.*, 2015), then we import them into the word segment code and get a corpus of 50,754 words by stop removals (punctuation, conjunctions, hyphen and sequence number, etc.). As a result, we get a corpus of 39,591.

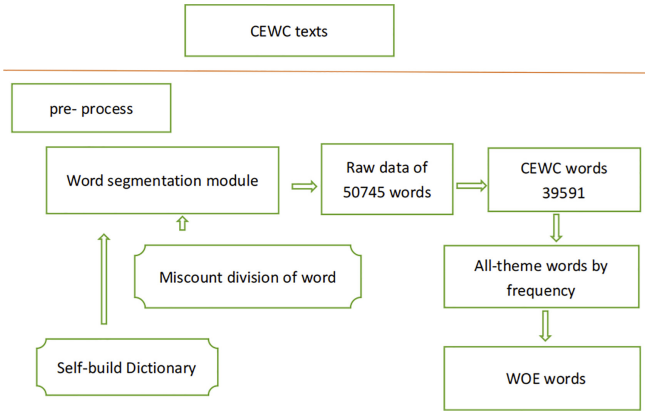

Figure 1.
Overview of the method

3.2 WOE dictionary

We aim to look into the WOE of CEWC communication that provides the directives of the economic outlook, that is, the orientation of the economy and its impact on the stock market. The WOE of CEWC can be identified by a number of industrial and strategic words, which are linked with the content of financial research (Bodnaruk *et al.*, 2015) rather than sentiment (e.g., tones and word surprises). Therefore, this study focuses on sorting out the orientation of the economy by the content of the CEWC. To date, there are two major approaches to gauging the content of CBC. They are machine learning and a dictionary of textual analysis. Machine learning is based on vector distance, Bayes classifications, likelihood ratios or other classification algorithms (Das and Chen, 2001; Loughran and McDonald, 2016). The dictionary approach relies on a bag of words (word lists) that share common categories of linguistic features (e.g. tone, sentiment, information, etc. (Bodnaruk *et al.*, 2015; Lin *et al.*, 2019; Möller and Reichman, 2021). In a comparison of the two approaches, Tetlock (2007, p. 1440) argues that the machine approach also requires the "estimation of likelihood ratios based on difficult to replicate and subjective classification of texts tone". In this study, we use the dictionary approach because, if a given text contains words belonging to a category, the text is more likely to translate the core intention to readers. In essence, the core meaning of substantial texts is defined and represented by the word count of the categorized words against the texts' total word count (Schmeling and Wagner, 2019; Tetlock, 2007; Bodnaruk *et al.*, 2015; Möller and Reichmann, 2021).

Extant research studies usually use self-built dictionaries and external word lists to gauge the linguistic features of texts. Picault and Renault (2017) argue that different types of words used in CBC have immense impacts on stock market volatility. Jansen and De Haan (2007) calculated the frequency of the word "vigilance" in the CBC to quantify the risk of price fluctuations. The most preferred word list is Harvard's General Inquirer, which has 182 tagged words including positive, negative, strong, weak, active, etc. In the field of finance and accounting, authors generally rely on the Harvard IV-4 negative and positive word categories. A word list of 285 words regarding financial uncertainty is used to measure imprecision (Loughran and McDonald, 2011). Bodnaruk *et al.* (2015) construct a unique word list of financially constraining word list including 184 words of constraints (such as comply, limit and prohibit).

Because the texts of CEWC are written in Chinese, we think the translation may dampen the accuracy if referred to the Harvard IV-4 (in English). Thus we apply the "Jieba" word dictionary to segment the words from the CEWC text and then filter out the finance-related words with a self-built finance phrase dictionary. Further, as the dictionary approach is not able to provide the rudimentary focus of the texts by the broad word list, we select the most frequently discussed words in CEWC.

4. Results

4.1 WOE of CEWC

Based on the results from word segmentation that is processed in Python "Jieba" module, we get 39,591 words by stop removals. To find out the most frequented words in CEWC, we import the 39,591 words into the word count tool of AntConc, and get Table 2.

Table 2. Core word frequency of CEWC

Core words	*n*	Min	Max	Range	Sum	Mean
改革 (reform)	28	14	46	32	669	23.89
发展(development)	28	20	84	64	1,306	46.64
稳 (stability)	28	6	35	29	545	19.46

Table 2 shows that in the past 28 communications of CEWC, three core words are identified as they record the highest frequency. They are "reform" (669 times), "development" (1,306 times) and "stability" (545 times) respectively. These words are in line with the WOE of the CEWC. For example, the CEWC 2021 (the communique of CEWC in 2021 published by People's Daily) overview is "handling the relationship between reform, development and stability properly".

We figure out the intensity of the 3 high frequency words by year and get Figure 2. It is noted that "Development" records the highest frequencies from 2004 to 2021 except for the years 2015 and 2016. In 2009 it reached an inflection point (84 times) and downed from 2010. On the other hand, the word frequency of "reform" and "stability" go together without too much volatility. The highlighted area in Figure 2, which marks the year from 2004 to 2009, is the period when "Development" (64) overwhelmingly dwarfs the "reform" and "stability" (32 and 29, respectively).

Then we apply correlation analysis to the word frequencies of the three core words as shown in Table 3. The p-value of "Reform" and "Develop" word frequency is 0.315; 0.389 ("Reform" and "Stabilize"); 0.119 ("Develop" and "Stabilize"). The three p-values are smaller than 0.5, indicating that there is no significant connection as to the three core words. This shows that our dictionary method is not subjectively selected.

But we are not able to figure out the intensity of the WOE by the three high frequency words. Instead, there may be other words that imply or connote the meanings of the 3 high frequency words, in other words, the frequncy method of the 3 high frequncy words as shown above is not able to tell the 'true' magnitude of WOE. To measure the intensity of WOE, we refer to the Chinese dictionary (Xinhua Dictionary) to screen out the words under the category of the three WOE words, and the result is shown in Table 4 (samples).

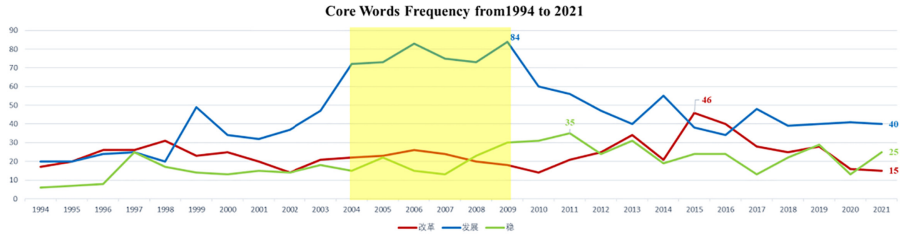

Figure 2. Frequency trend of core DT words

Word		development	stability	Word		stability
reform	Pearson Correlation	−0.197	0.169	development	Pearson Correlation	0.301
	Sig. (2-tail)	0.315	0.389		Sig. (2-tail)	0.119

Table 3. Correlation of 3 WOE word Frequencies

WOE words	改革 (reform)	发展 (development)	稳 (stability)
Derivatives	改	加快	巩固
	改进	倾斜	稳步
	改造	增强	保持
	改善	大力	保
	改组	大规模	保障
	...	...	...

Table 4. Sample words of the three core words showing WOE

4.2 The impact of CEWC by N-day trading

The stock market in China is composed of Shanghai securities and Shenzhen securities, which are represented by the Shanghai Composite index and Shenzhen Composite index, respectively. We choose the CSI 300 as our measurement benchmark. The CSI 300 index constituted 300 securities of the most representative securities with a big scale and strong liquidity in the Shanghai and Shenzhen markets, and it was first produced on April 8, 2005, to reflect the overall performance of securities listed in both markets. This index's industry distribution is proven compatible with the market performance.

The impact of CEWC on the stock market varies with the specific trading days, which usually are classified into six types, the 1st trading day, 7th trading day, 30th trading day, 90th trading day, 180th trading day and 270th trading day after the event-day of CEWC. We also consider the number of CEWC and get the mean of stock fluctuations after the event-day of each CEWC during the past 12 years. The result is shown in Figure 3.

Figure 3 shows the probabilities of the ups and downs of the stock market. By the curve, we hypothesize that the impact of CEWC on the stock market is most prominent within 30 trading days, and therefore 30 trading days is taken as the trading day by default in this study. The validity of market indices against the 3rd, 7th and 30th day is shown in Table 5, which is calculated based on the fact that we give "up" to the dumb variable "1" and "down" to the dumb variable "0".

From Table 5 we can see that the 3-day rise and the 7-day rise after the event-day are significantly positively correlated ($p = 0.837$, Sig. > 0.05). The 3-day rise probability against 30-day trading is also relatively positively correlated ($p = 0.598$, >0.5). The 7-day with the 30-day is significantly positively correlated ($p = 0.714$, Sig > 0.5). This shows that the stock market may go on an uptrend after the release of CEWC within 3 to 7 days.

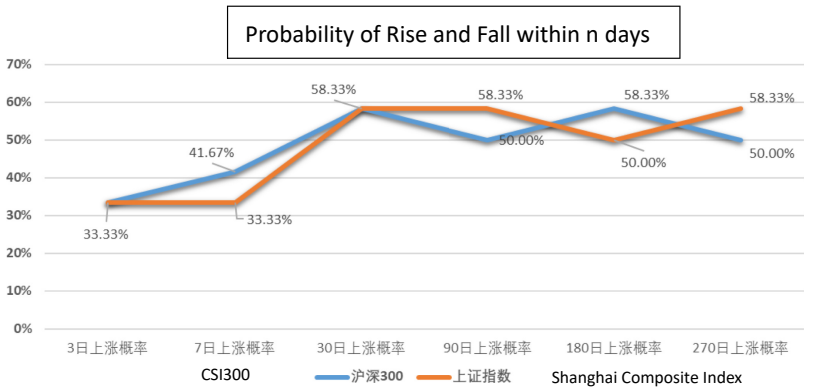

Figure 3.
Trading in N days

Table 5.
Correlation of CSI 300 by 3, 7 and 30 days

		CSI300 7 days	CSI 300 30 days
CSI 300 3 days	Pearson Correlation	0.837**	0.598*
	Sig. (2-tail)	0.001	0.040
CSI 300 7 days	Pearson Correlation		0.714**
	Sig. (2-tail)		0.009
n		12	

4.3 The WOE and stock market

We conduct a correlation test of WOE and the stock market performance. The result is shown in Table 6.

With correlation testing, this study finds that only "development" is significantly positively correlated with the 30-day CSI 300 ($p = 0.621$, Sig. > 0.5). "Reform" and "Stability" are weakly correlated with the assigned n-trading days (3-day, 7-day and 30-day).

To calculate the importance of the "development", we devise the impact equation of WOE.

$$\mathrm{IMP(x)} = \sum w_n \left|\Delta Index(x)_n\right|^{*} 100 \Big/ \frac{\sum x}{\sum X}$$

where Imp (x) means the impact of "x" WOE on the stock market, Δ Index(x) stands for the rise/fall degree of the chosen financial index in the form of percentage, ∑x stands for the sum of frequency of "x" in the word-lists of in CEWC, ∑X stands for the sum of the frequency of all theme-related words, n stands for the number of days after the release of CEWC communique and w stands for the weight.

Figure 4 shows the linear regression of the proportion of "development" to the total three core WOE words ($R2 = 0.386$). And we interpret it as being indicative of the rise of the stock market, that is, when word frequency of "Development" accounts for above 40% of the total WOE words in CEWC, the CSI 300 has a greater probability of uptrend.

		CSI 300 3 day	CSI 300 7 day	CSI 300 30 day
"reform"	Pearson Correlation	−0.447	−0.282	−0.427
	Sig. (2-tail)	0.145	0.374	0.166
"development"	Pearson Correlation	0.370	0.494	0.621*
	Sig. (2-tail)	0.236	0.103	0.031
"stability"	Pearson Correlation	0.134	−0.331	−0.299
	Sig. (2-tail)	0.678	0.294	0.346
n			12	

Table 6. Correlation between the 3 WOEs and CSI 300

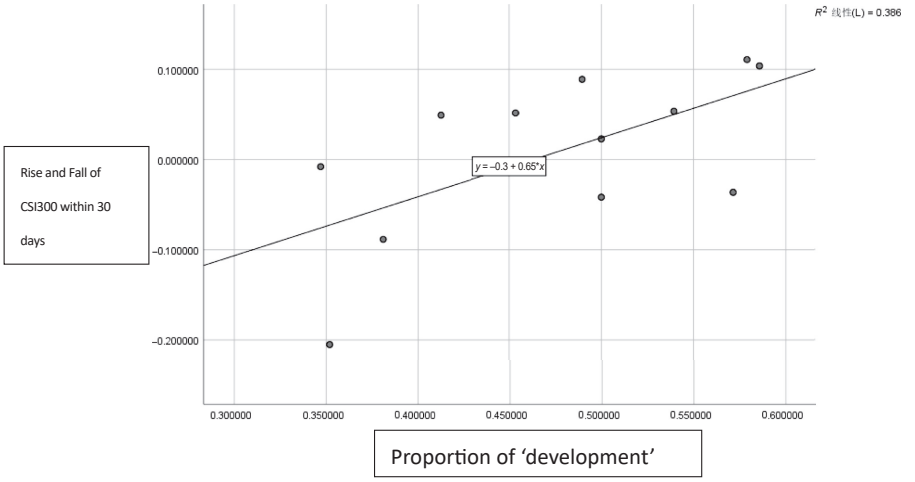

Figure 4. Linear regression of "Development" on stock market

The data validity is evidenced with Bartlett test. Table 7 shows that the K value of "development" word lists is valid (KMO = 0.645).

5. Discussion

The first question that this study deals with is whether there are words that indicate the orientation of the economy in the CEWC. We have shown that CEWC is the authoritative body that usually provides the orientation of the economy in the coming year, which is the result of holistic consideration. Such orientation of economy is linguistically expressed in the CEWC by corresponding words. WOE is a novel concept that implies the words of future economic activities. It is a strategic concept that may deliver the general tone of the economy, and has been proven to link with the stock market. In contrast, previous academic research studies give attention to the specific aspects of finance and its impact on the stock market, which may usually be too narrow and limited in forecasting the stock market performance. For example, Guo *et al.* (2021) divide the texts of PBOC's quarterly reports into three aspects, namely, topics, policies and tones. They argue that topics in PBOC may signal the highlight of the stock market in the coming year. Interestingly, the topics are usually industry-related instead of the orientation of the economy. Jung and Kuehl (2021) went a step further on the topics. He classified the information on the homepage of the CB into nine main topics, which is roughly the copy of the homepage (including media, research and publications and monetary policy, etc.). The topics herein are actually the structure of the website page, and are not the topics of finance or the monetary system in the strict sense. Lunsford (2020) noticed this and concentrated on the relationship between economic outlook and policy orientation. He suggested that there is a policy orientation in the CBC that can signal the economic outlook. We think this research is the first one that attempts to link the orientation of policy with the economic outlook. The orientation of policy in the research refers to the "positive" or "negative" attitude of the policy, that is, positive is defined as supportive verb words like "promote, enhance," etc. While "negative" is defined as impeding verb words like "stop, prohibit," etc. However, the notion of a field-specific or industry-specific lexicon may not produce an accurate forecast of the economic outlook (Lunsford, 2020). In a nutshell, we think the trend or orientation of these research studies does not link the economic outlook with the orientation of the economy.

Tausczik and Pennebaker (2010) argued that the depth of thinking or attention is reflected in the language style, which links thoughts. In other words, the choice of words or intensity of words reflects the intention of the speaker. In the case of CEWC, the intention of the speaker includes his/her view on the orientation of the economy. To avoid subjective selection, we devise an approach that can figure out the orientation of economy by WOE frequency, that is, by the words that connote the orientation of the economy. This approach, compared to the extant ones, is more objective in that more orientation words are included rather than specific words. For example, the language surprise or language proxy, which relies on similarities or differences of certain language features, is used to provide cues to predict the market (Guo *et al.*, 2021). The differences between three types of words (constraint, tone and uncertainty) are the controllable variables to measure the impact of the EU CB (Möller and Reichman, 2021.

Table 7.
Data validity test

KMO and Bartlett test		
KMO measure of sampling adequacy		0.645
Bartlett spherical degree test	Approximate Chi-Square	35.946
	Degree of Freedom	3
	Sig.(2-tail)	0.000

Semantic words of PBOC are sampled with 19 kinds, namely, inflation, price level stability, deflation, etc. (Lin and Zhao, 2015). Jansen and De Haan (2007) rely on the frequency of the only one word "vigilance" in the CBC to show the risk of price fluctuations. A word list of 285 words regarding financial uncertainty is used to measure the imprecision of the CBC (Loughran and McDonald, 2011). Therefore, this present study makes a contribution to the literature in that it adopts an approach that calculates all the words connoting the orientation of the economy.

The results of this study go beyond the common focus of communication effectiveness. Tetlock (2007) provided that the content of financial language can influence stock market movements with a bag of words that are indicative of the content. Picault and Renault (2017) use different types of words of CBC to gauge the volatility of the stock market. With Figure 2, we can see that each of the three WOEs ("development", "reform" and "stability") interacts and intercepts the other two WOEs from 2004 to 2009, which clearly expresses the call for an active economic increase. From 2010 to now, "development" still outpaces the other two, though the gap is narrowed, indicating that it is in line with the tone " to solve problems by means of development" in CEWC.

The second question of this study is to determine which of the WOEs has stronger impact on the stock market. From Figure 3 and 4, we show that the impact of CEWC on the performance of the CSI 300 index is more apparent in 30 days after the day of release. This finding is achieved by figuring out the probability of a rise relating to the orientation of the economy, compared to the real market performance. Previous research studies did not provide a clear time length for N in the N-day trading. For example, the impact of PBOC communication on the stock market is only found to be largely time varying Guo *et al.*, 2021; Blinder *et al.*, 2008), which do not work out the N in the N-day trading. And "N" is not able to be calculated on the excuse of long or near-term factors (Jung and Kuehl, 2021; Brubakk *et al.*, 2021).

Investors are not only satisfied with fixing the n-day, but also interested in which WOE can be more indicative of the rise/fall of the stock market. In this study, we find that if "development" is 40% higher than the other two core words, there is a higher likelihood of rise in the stock market. Previous research attempts to expound the cause of stock market performance from various fields. Beutel *et al.* (2021) attribute the ups and downs of the stock market to individuals' expectations of financial stability, which is acquired by the interpretation of language features in the CBC. Tetlock (2007) found that the content of a *Wall Street Journal* column influences investor's psychology and sociology, and eventually the stock market movements because investors buy in the credit of the content expressed in the CBC. However, we assume that WOE can enhance the Pygmalion effect. The Pygmalion effect, proposed by Harvard's psychologist Rosenthal (2002) refers to a psychology and action spiral, which is driven by incremental reinforcement from four factors, that is, climate, feedback, input and output. Mohammed Nadeem (2017, p. 2) stated that the Pygmalion effect "applies to all kinds of settings, from sports teams to the military to the corporate workplace." The four factors can be applied to the stock market. Climate corresponds to the release of CEWC, which offers the environment of WOE. Feedback is akin to the responses from the investors' behavior. Input stands for the verbal or written clues that demonstrate the level of interpretation and level of recognition. Output refers to investors' ideas, uncertainty or trust expressed in the press conference, the interviews and the Q&A, which may lead to skepticism/pessimism about the CEWC (Loftus, 1995).

6. Conclusion

Noticing the increasing role of CEWC in the Chinese economy, we study the impact of CEWC on the stock market instead of the PBOC. In line with the texual analysis approach, this study builds a novel WOE that signals the orientation of the economy and figures out the three

WOE categories based on a broad objective Python approach. Further, we calculate the impact index of each WOE of the three WOE categories and find that WOE can be used to forecast the orientation of the economy, and the different WOE exerts varying impact on the ups and downs of the stock market. In CEWC, if "development" is above 40% over the other two, there is a high possibility of the stock uptrend.

This paper has practical implications. The identification of WOE helps investors read out the orientation of economy and the degree of different WOEs. Investors are keener to know "what" content of the CEWC that leads to the rise/fall of the stock market (Guo *et al.*, 2021; Möller and Reichman, 2021). The impact index can be an indicator of a tendency of the stock market, which upgrades the rationality of investment decisions.

As WOE is only proven in the CEWC, this paper has its limitations in the scope of samples. It is necessary to apply WOE to more CBC and countries. It is desirable to apply the Gunning–Fog index (Li, 2008; Möller and Reichman, 2021) in future work, to increase its effectiveness (Lin *et al.*, 2019).

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