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A textual analysis of central bank communication the case of Indonesia

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Abstract

The objective of this paper is two-fold: (1) to assess the textual aspects of the Central Bank of Indonesia's monetary policy communication and (2) identify their potential relation to the inflation expectations. Using monthly policy interest rate press release announcements, we found that the text readability is relatively stable, although the text complexity is higher. However, the clarity and readability of the text are negatively correlated with the inflation expectations. Meanwhile, the tone of the text is positively associated with the inflation expectations. They suggest that the central bank should strengthen the quality of the text announced and pay more attention to the informal communication channels. The high quality and use of informal communication channels provide additional pieces of information in shaping price expectations in the future.

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1 Introduction

The effect of the central bank monetary policy communication on the inflation expectations has received much attention in recent years. Communication becomes an instrument of the monetary policy itself, which it is perceived as an unconventional monetary policy gallery and controlling market expectations (Yellen, 2013), and manipulated expectations (Bernanke, 2010). The better the expectation is in line with the monetary-policy purpose, the more effective the central bank would be in stabilizing aggregate demand and price fluctuations (Weidmann, 2018). Accordingly, communication becomes an integral part of monetary policy devices (Draghi, 2014; Parjiyo and Juhro, 2016).

Along with the increasing demand for central bank accountability and transparency trends, the clarity of announcements is an important aspect of the communication process. Poor quality of communication in delivering information could lead to misinterpretation by counterparts, causing uncertainty about the sustainability of inflation in the future, and encouraging financial market players to make inappropriate decisions (Montes and Curi, 2017). Hence, the uncertainty of inflation expectations will determine the actual inflation rate. As in the long run, it potentially creates inflation uncertainty.

The formation of the private sector's inflation expectations is a prominent requirement for the successful of monetary policy in the future, especially in developing countries that adopt the inflation-targeting framework. Under the inflation targeting policy, the central bank has to achieve the target despite uncertainty condition of the future inflation. In this case, the clarity of the information content of the central bank announcement would be an appropriate guide for the future policy direction of the economy. It will help the central bank in emerging markets to avoid inflation volatility rather than by using an active monetary policy (Cabral *et al*., 2018).

Indonesia, as a developing nation, is a good case to assess the nature of monetary policy and price stabilization in the context of central bank communication. High inflation rate after the Asian monetary crisis in 1997/98 has pushed the Central Bank of Indonesia to conduct economic recovery and stabilization programs. The Act No. 23/1999 protects the independence of the Central Bank of Indonesia to any interventions. As a result, the Central Bank of Indonesia has the authority to been implement inflation targeting frameworks since July 2005. Thus, Indonesia in the 2010s is one of the major emerging countries to conduct numerous economic reforms that yield lower inflation rates. This condition has led to the question of the effectiveness of central bank communication policy.

This study will discuss the textual aspects of the Central Bank of Indonesia's monetary policy communication. Some aspects to be investigated include the clarity and readability of monetary policy announcements. After that, we assess their consequences for the inflation expectations. Taking the case in Indonesia, the lessons learned would be beneficial to improve prices stabilization policy for the other developing countries. The remaining sections of this article will be structured as follows. The next section presents a review of the recent literature. The methodological aspects and the data are explored in the third section. The fourth section discusses the results of the study. In the final section, conclusions and policy implications are drawn.

2 Literature Review

A wide variety of frameworks has been developed to explain the expectations formation process. However, information about many aspects of monetary policy decisions and their implementations offered by central banks leads to different results. Jansen and De Haan (2007) found a negative relationship between European Central Bank (ECB) communication regarding risk and price stability. In contrast, Ullrich (2008) showed that the information content of the speech of the central bank leadership contributes to the explanation of the formation of inflation expectations.

Jansen (2011a) directed attention to the clarity of the announcement. Using the readability statistics of Humphrey-Hawkins testimony given by the Chair of the Fed, he concluded that clarity of information had an effect on diminishing volatility. Using the same method, Jansen (2011b) showed that the testimony given by Volcker and Greenspan was difficult to follow. Those conclusions imply that the information needs of the general public through different and more accessible communication channels are required to improve transparency.

To the extent of the difference of views, Oliveira and Curi (2016), as well as Montes *et al*. (2016), concluded that clarity and transparency can reduce dispersion about inflation expectations. Montes and Nicolay (2017) showed that clarity of information assists the central bank to establish monetary policy credibility. They argued that transparency and communication can lower uncertainty about the intention of the central bank, convey its actions in the future, and improve the information supplied by the central bank. Lee *et al*. (2019) found that Korean lexicon-based measures help the economic agents in predicting the monetary-policy decision of the Bank of Korea.

On other avenue, Brand *et al*. (2010) looked at the effects of communication policy which are affecting the level of money markets and the predictability of monetary policy stance. Rosa (2010) found that the exchange rate responds to the explanation given by the central bank. Born *et al*. (2012) by taking the case of the ECB and the Fed found communication regarding macro-prudential supervision significantly affects the stock markets in emerging economies. Similar studies were conducted to output (Hansen and McMahon, 2016), financial market (Moessner, 2014), and interest rates (Seelajaroen, *et al*., 2020) and found diverging results, however.

Some aspects of communication have attracted much attention in emerging economies. Rozkrut *et al*. (2007) studied the impact of central bank communications in Czech, Hungarian, and Polish on the financial markets. They found that different communication strategies have different effects. Başkaya *et al*. (2012) showed that the implementation of monetary policy and intensive communication efforts exerted by the Turkey central bank reduce the sensitivity of expectations to the realization of inflation. In India, the effectiveness of communication in governing the predictability of monetary policy relies on the structure of monetary policy and the central bank's communication strategy (Mathur and Sengupta, 2019). The official inflation forecasts released by the Central Bank of Philippines significantly affect the private-sector economists' inflation expectations not only for the corresponding year but also one-year ahead (Espano, 2018).

While empirical research on monetary policy communication in both developed and emerging countries has been widely conducted, a similar study in Indonesia is limited. Hakim (2016) found that the inflation rate target set by the Central Bank of Indonesia does not significantly affect the actual inflation rate. This indicates the dominance of the backwards-

looking mindset in shaping inflation expectations. Since inflation expectations affect the future price movements, it is not surprising that the Central Bank of Indonesia has become so responsive in responding to any changes in the inflation expectations (Dewati *et al*., 2009).

Other researchers are focusing on a forward-looking approach. Using survey data, Anwar and Chawwa (2008) indicated that the market perception survey is better reflected in the targeted inflation rather than the actual inflation. Another interesting finding is that the implementation of the inflation-targeting policy has directed economic agents' expectations to follow the announced inflation target. In contrast, Agustin *et al*. (2015) evaluated some obstacles which are related to survey data. They also found that respondents' concern about the central bank's inflation target is relatively limited.

Sahminan (2008), based on the official announcement of the central bank's monetary policy, found that the loose-policy tendency statements tend to be more effective compared to the strict-policy tendency statements to control the short-term interest rates. Dewati *et al*. (2009) emphasized that the communication strategy has a significant influence in determining the gap between inflation expectations and actual inflation. An increase in one wording indicator unit will reduce the inflation expectation gap. It means that the announcement released by the central bank helps to construct expectations, so that the actual inflation will be closer to the inflation expectations.

Recently, Ahokpossi *et al*. (2020) argued that the Central Bank of Indonesia has made significant progress in the transparency of its communication as well as in the institutional framework to support this. Nonetheless, their results suggest ways in which the impact of communication can be further improved, including by strengthening the clarity of policy messages. Kuncoro (2021) proved that the clarity of policy messages significantly reduces the inflation volatility. However, Ahokpossi *et al*. (2020) did not discuss the expectation inflation and Kuncoro (2021) focused on the inflation expectation gap, instead of inflation expectation itself.

Moreover, empirical works on central bank communication show contradictory conclusions. They are challenges for researchers to further investigate direct, transparent, and objective measurements of the verbal information of central bank’s communication. Lucca and Trebbi (2011) noted that most research focused on formal communication, financial stability reports, and press conferences. Garcia-Herrero *et al*. (2019) showed robust empirical evidence of powerful oral and written communication from the central bank. In contrast, Su *et al*. (2019) concluded that informal channels seem to be more fruitful than formal ones. Therefore, inevitably it requires further investigations.

3 Research Method

This research assumes that the textual clarity of monetary policy announcements in terms of the inflation expectations will strengthen the credibility of the central bank policy in managing macroeconomic variables. For this reason, the present study will start to explore the monthly-governor's board meeting press release to the public.

However, conducting this method is not an easy task. Monetary policy statements generally comprise a variety of information: an appraisal of the current state of the economy within the business cycle, analysis of the recent monetary conditions, the monetary policy stance, and

alternatives direction on future policy. Praet (2014) exemplifies that much of the vocabulary used by central banks in communicating is less relevant to the audience but intuitively the contents of the message are very relevant to the lives of many people.

The linguistic literature on communication clarity focuses on the readability aspect. Since most of the communication is delivered in the written forms. Therefore, legibility is an important part of this framework. Clarity closely relates to the legibility of texts (Jansen, 2011a and 2011b; Bulíř *et al*., 2013; Montes *et al*., 2016; Jansen and Moessner, 2016; Mendonca and Nicolay, 2017; Montes and Nicolay, 2017). When someone has to read text with complex words or compound sentences, he/she will experience difficulties extracting the main message (Jansen, 2011b).

The first dimension of the text complexity concerns the number of words used. The readers may be cognitively suffered when they face longer statements. It is similarly important to consider the grammar and structure of the statement. For this purpose, clarity of announcement should be able to gauge the readability and lexical diversity of the statement. The Flesch ease score (Flesch, 1948) is a good representative to capture the clarity of the text announcement. Flesch's statistics takes into account two textual aspects: (1) the number of syllables per word and (2) the number of words per sentence.

The Flesch index (*FI*) shows the ease of reading text. The scores range from 0 to 100. A score of 100 indicates easy to understand text, a score of 70 indicates easy to understand text for adults, a score of 30 indicates very difficult to understand the text (Flesch, 1948). The Flesch index formula is:

$$FI = 206.835 - 1.015 \times \frac{\#Words}{\#Sentences} - 84.6 \times \frac{\#Syllables}{\#Words} \quad (1)$$

The Farr-Jenkins-Paterson (FJP) index (Farr *et al.*, 1951) counts the number of one syllable words per 100 words. The FJP index has a negative sign. The interpretation is that the lower the index value (for example, −50), the statement made is less legible. The FJP formula can be specified as:

$$FJP = 1.599 \times \frac{\#Syllables}{\#100\ words} - 1.015 \times \frac{\#words}{\#Sentences} - 31.517 \quad (2)$$

Furthermore, Kincaid *et al*. (1975), derived from the Flesch index, modified a formula which calculated it into a level (*GL*) to evaluate a text.

$$GL = 0.39 \times \frac{\#Words}{\#Sentences} + 11.8 \times \frac{\#Syllables}{\#Words} - 15.59 \quad (3)$$

GL values indicate direct clarity. If *GL* increases, it represents higher clarity in communication. *GL* at level six, for example, fits for someone under formal education who is 11-12 years old.

The Flesch, FJP, and *GL* indices are the most widely readable readings indicators used in the literature on central bank monetary policy communication (Luangaram and Wongwachara, 2017). Since the Flesch formula is very similar to the Kincaid formula, this study chooses the first one rather than the second one as it has been less frequently used in the references. Moreover, the FJP index is highly correlated with the two previous formulas (Mathur and Sengupta, 2019).

The readability index approach has some advantages of not creating a researcher's bias, just considering the textual characteristics, and setting aside any subjective measurements (Nicolay and Oliveira, 2019). However, the three readability indices above are English-based measurements. The text readability index in Indonesian is developed by Pranowo (1998). Different from English-based methods, the Pranowo formula has thirteen indicators for measuring readability. Unfortunately, the Pranowo index is rarely used. Biddianika *et al.* (2016), for example, exploited the Pranowo formula and found that it did not really contribute to the difficulty of biomass energy reading comprehension in Indonesian in spite of the origin of the technologies' terms coming from another language.

We do not adopt the Pranowo index for several reasons. First, the three readability indices above have become universally applicable to non-English languages, such as Finnish, Hungarian, Malaysian, Spanish, Turkish (Taylor, 2012), and possibly Indonesian. Second, according to Singer and Dohlan (1982), readability can be determined by using formula and reader responses. While the standard readability indices are based on the characters, syllables, words, sentences, and paragraphs, the thirteen indicators proposed by Pranowo are typically a set of tests on the ability to read a text which is beyond the scope of this study. Third, we use the index in the first-difference because the importance is not the level of text readability of the announcements, but it's deviation. The first-difference of the index is consistent to infer whether the communication becomes clearer. Thus, it is more sufficient to explain the formation of inflation expectation.

The second dimension of the text complexity concerns the content. The loose-policy tendency statements tend to be perceived differently compared to the strict-policy tendency statements which probably are more effective to shape the public expectation. The 'tone' contents of the release of the results of the board of governors' meeting are classified into an index that uses a discrete and positive scale. The contents of the announcement giving clarity of the policy direction for the future are given a score of 1. A score of 0 is given for 'flat' announcement content without informing any policy direction going forward. Therefore, this index is a binary dummy variable about the message of the monetary policy.

The inflation rate is understood to be a relative increase in the general price index. The expected inflation refers to the expected price index, while the actual inflation refers to the actual price index.

$$Inf^a = \frac{PA_t - PA_{t-1}}{PA_{t-1}} \approx Log\,(PA)_t - Log\,(PA)_{t-1} = \Delta\, Log\,(PA)_t \qquad (4a)$$

$$Inf^e = \frac{PE_t - PE_{t-1}}{PE_{t-1}} \approx Log\,(PE)_t - Log\,(PE)_{t-1} = \Delta\, Log\,(PE)_t \qquad (4b)$$

This study used data mostly from the Central Bank of Indonesia. The text of the press release of the Board of Governors' Meeting results published by the Central Bank of Indonesia will be reviewed for clarity as well as readability. The official text was obtained from the Department of Communication of the Central Bank of Indonesia. We used the Monthly Report in Indonesian, even though the official English translation is also provided. This is unavoidable due to the Governor Board of the Central Bank of Indonesia uses Indonesian for their internal discussions, decision making, and announcement to the public. Therefore, economic agents react to the Indonesian version.

Data on inflation expectations were also obtained from a survey by the Central Bank of Indonesia. The Central Bank of Indonesia conducts a routine monthly survey of a sample of

all economic actors to determine the future inflation forecasts. The wide respondents' characteristics which are covered by the survey are representative to presumably infer the expected price from the central bank policy statement. The inflation expectations are classified into three periods: inflation 3- (shorter period), 6- (medium period), and 12- (longer period) month-ahead. The actual price index was collected from the Central Agency of Statistics. The consumer price index is calculated for 1 month as a reference to the prices level expectations. The scope of this research extends from April 2016 to December 2019. The April 2016 period is set as the beginning of observation related to the use of 7-day reverse repo rates as policy rates replacing the BI rate.

4 Results and Discussion

Table 1 provides the descriptive statistics covering mean, median, and extreme (maximum and minimum) values for each variable of interest. The average values of the inflation expectation ($Inf1^e$, $Inf3^e$, and $Inf12^e$) and actual inflation (Inf^a) rates are not far from each other. The 3-month-ahead expected inflation rate is relatively volatile compared to the two others as presented by the higher standard deviation as well as the range of extreme values. However, applying a one-sample test proves that the mean value of $Inf1^e$, $Inf3^e$, and $Inf12^e$ significantly is not different from each other at the 95 percent confidence level.

The mean value of FI is 21.7, which means that the text of announcements is very difficult to read. This is supported by the JFP index whose average value is -50.8. In the US education system, for example, the 22-scored readability text is best understood by university graduates. The result is reasonable when we look at the tone. The number of the announcement giving clarity to the future direction is less than that of the 'flat' announcement. Our question is whether the low inflation expectation rate is associated with the lack of policy direction going forward or alternatively refers solely to the target and actual inflation rate, i.e. the public expectation is independent of the monetary policy announcement. It will be checked again more deeply using statistical methods.

Table 1: Descriptive Statistics

	$Inf1^a$	$Inf3^e$	$Inf6^e$	$Inf12^e$	FI	FJP	TONE
Mean	0.0028	0.0001	0.0029	0.0018	21.6944	-50.8172	0.3182
Median	0.0023	0.0044	0.0090	0.0006	21.6257	-50.6802	0.0000
Maximum	0.0097	0.1101	0.0695	0.0528	22.5846	-48.3123	1.0000
Minimum	-0.0027	-0.0908	-0.0595	-0.0366	20.7329	-54.0971	0.0000
Std. Dev.	0.0027	0.0396	0.0291	0.0176	0.4705	1.2998	0.4712
Skewness	0.3719	-0.1424	-0.1971	0.4959	-0.0393	-0.4969	0.7807
Kurtosis	2.6430	3.7995	2.5269	3.5085	2.1900	3.0043	1.6095

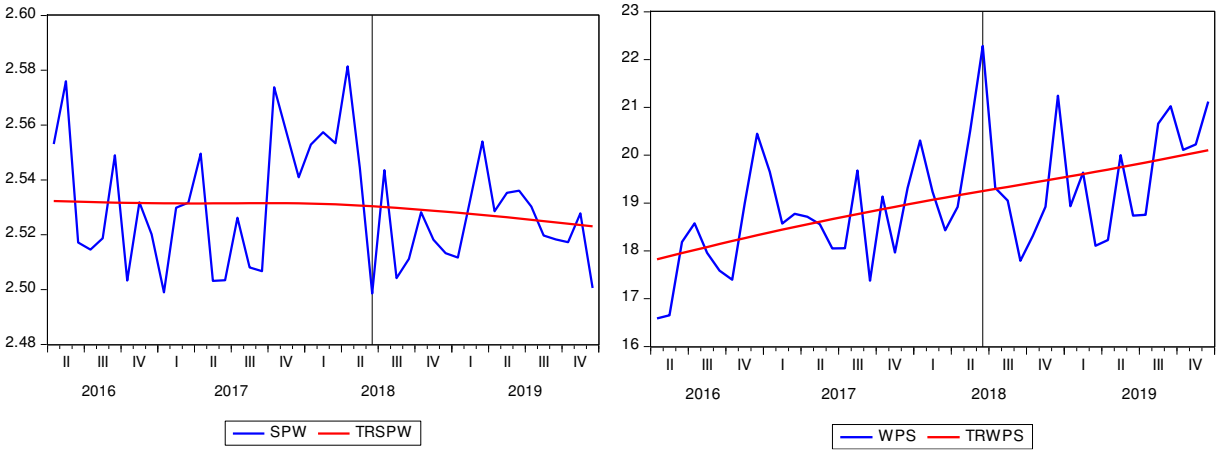
Source: Central Bank of Indonesia and Central Agency of Statistics (processed)

Figure 1 shows the variety in vocabulary index. The left side of Figure 1 displays that the syllable per word (SPW) slightly declined. The high syllable per word took place at the beginning of 2016 and 2018 when the exchange rate sharply fluctuated. At those times, the

central bank used many explanations to cool down the market. It seems that the central bank optimized any aspects of communication including moral persuasion along with a technical monetary policy to achieve market stabilization.

Despite the decrease in the syllable per word, the average number of words per sentence (WPS) is in the upward trend. The central bank at present uses around 3 more words in a sentence referred to the past. This is, of course, a negative development for text readability as it does not simplify the sentence structure. We also discover that the WPS and SPW are normally distributed, but the SPW distribution is less skewed than that of WPS. It implies that most of the mass data of WPS lie on the right side, thus the mode's value is greater than the mean value.

Figure 1: Text Readability



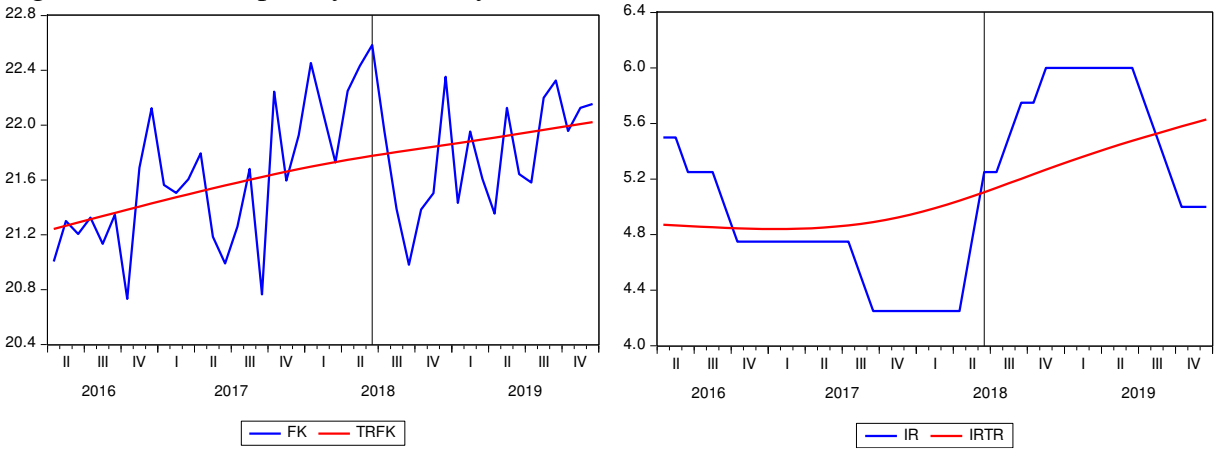
Syllable per Word

Word per Sentence

The comparison of text readability between two Governors (Agus Martowardoyo replaced by Perry Warjiyo in May 2018) does not alter the conclusion. The SPW and WPS remained stable and the format of the announcements did not change. However, at the beginning of the Perry Warjiyo era, he used many words per sentence but less syllables per word. It took place concurrently with the nature of the economic cycle and the background to the policy interest rate decisions.

Furthermore, based on Figure, 1 it is not surprising that the text complexity substantially hikes. The left side of Figure 2 shows the Flesh-Kincaid (1975) index of complexity increased from 21 to 22 points for the whole observation period. An average of 22 points is very difficult to read in the tone of monetary policy announcements (as presented in the right side of Figure 2). Therefore, the complexity of communication should be focused not only on the senders and intermediaries but also on the receivers (Blinder, 2006).

Figure 2: Text Complexity and Policy Interest Rate



FI Index of Complexity

Monetary Policy Stance

It is generally accepted that a more difficult central bank statement could deteriorate the ability of market participants to make informed judgments – displaying the gap between the quantity and the quality of communications. More conspicuous press releases announcements are also related to lower monetary policy forecast errors (Siklos, 2011). However, it is difficult to determine based solely on these indices whether the economic message of the interest rate announcements became more difficult to understand. It is also reasonable to assume that the addition of graphs, for instance, inevitably improved the quality of communication, but this improvement is not reflected when focusing on indices that take only word and sentence lengths into account.

The complexity index does not take into account the content of the text, but it is clear that knowledge in the field relevant to the text helps to understand it. It is worth to note that a complexity level that is too low will make it very difficult to properly deliver technical and professional messages. Accordingly, text, words, and sentences only refer to the semantic orientation. They are not intuitively vulnerable to quantification in the context of intensity and direction of meaning.

The above semantic measures have their strengths and weaknesses. The central banks could be too wordy without providing any meaningful information. The problem is that it is subjective, depending on the reader's judgment and can be time-consuming. Table 2 shows how communication scores based on written statements could cover the monetary policy position of the central bank and systematically affect the interest rate policy. There is no judgment involved and therefore it is more comparable and easy to assess. It is based only on word frequencies, as well.

Table 2: Top 20 Keyword Counts

No.	Word	Count	No.	Word	Count
1	Inflation	600	11	Banking system	177
2	Economic growth	358	12	Exchange rate	173
3	Bank credit	311	13	Monetary policy	158
4	Government	258	14	Consumption	151
5	Price	244	15	Current account deficits	112
6	Interest rate	237	16	Liquidity	107
7	Export	231	17	Foreign capital	106
8	Investment	225	18	Trade account	104
9	Import	204	19	Domestic demand	97
10	Financial market	178	20	Macroprudential	92

Source: Central Bank of Indonesia

Next, we run correlation as performed in Table 3. The coefficients of correlation among the expected inflation rates are positive. It is shown that the correlation between $Inf6^e$ and $Inf12^e$ is higher than the correlation among the two variables and $Inf3^e$ respectively. It seems that the longer pair inflation expectation, the higher its correlation, suggesting the potential impact of the quality of the central bank monetary policy announcements. Connecting them further to the readability index offers some interesting results. The clearer the monetary policy announcement is associated with the lower expected inflation rates. Conversely, the clearer tone of the announced monetary policy text released is related to the higher expected inflation rates.

The above results indicate that market players relatively do not consider the quality of information provided in the central bank announcement to perform their 3-month-ahead inflation expectation. They pay more attention rather to the current inflation rate or target inflation rate. This result confirms Ullrich (2008) regarding the speech statement, Sahminan (2008) in the context of the policy interest rate announcement, and Kuncoro (2021) with regard to inflation gaps.

However, the result is quite different when we consider the 6- and 12-month-ahead perspectives. The market players respond to the change in information contents. In this case, they would decrease their inflation expectation irrespective of the actual inflation rate. It means that the degree of backwards-looking behavior gradually declines (as found by Dewati *et al*. (2009), Agustin *et al*. (2015), and Hakim (2016)). In the international context, those findings confirm Başkaya *et al*. (2012) and Espano (2018) respectively.

The above results show that the market players could be risk aversive, trusting the central bank announcement in the longer time horizon. Accordingly, they prefer to believe that the central bank will commit to the inflation target rather than the actual inflation rate as found by Anwar and Chawwa (2008). The above results are plausible. The targeted inflation rate in Indonesia is set for a year-ahead – instead of a month-ahead or three-month-ahead – and applies for three years in advance. Therefore, the market players consider the signal of monetary policy to be credible.

The central bank commitment to the inflation target is also justified here. In this case, the capability of a central bank to preserve the current inflation rate is critical in stabilizing inflation volatility in the long-run as found by Lee *et al*. (2019). It also is notable that

inflation stabilization in the future requires inflation stabilization in the current period to maintain the credible monetary policy as found by Montes and Nicolay (2017). This finding is also consistent with the most empirical studies in Asian countries as explored by Filardo (2018).

Table 3: Correlation Matrix among Inflation Expectations and Textual Aspects

	$Inf3^e$	$Inf6^e$	$Inf12^e$	ΔFI	ΔFJP	TONE
$Inf3^e$	1.00	0.02	0.42	-0.19	0.04	0.14
$Inf6^e$	0.02	1.00	0.55	-0.24	0.26	0.08
$Inf12^e$	0.42	0.55	1.00	-0.21	0.20	0.24
ΔFI	-0.19	-0.24	-0.21	1.00	-0.81	0.03
ΔFJP	0.04	0.26	0.20	-0.81	1.00	-0.08
TONE	0.14	0.08	0.24	0.03	-0.08	1.00

The findings above suggest improvements in transparency as found by Ahokpossi *et al.* (2020). The central bank monetary policy communications are important in the process of shaping inflation expectations. Since monetary policy and central bank communication also reflect some institutional aspects, we next conduct a one-way analysis of variance test to check whether the three types of inflation expectations differ between two regimes (before and after May 2018). The results are presented in Table 4.

The result regarding the sensitivity of two regimes, unfortunately, is insignificant, confirming to the visual inspection on Figures 1 and 2. There are no differences in inflation expectations between the two regimes nor institutional aspects. However, the inflation expectation becomes more responsive, particularly at the higher inflation rates which are in line with Mathur and Sengupta (2019) in the case of India.

Table 4: One-Way Anova Test

	$Inf3^e$		$Inf6^e$		$Inf12^e$	
	Stat	Prob	Stat	Prob	Stat	Prob
F	0.9560	0.3930	0.4243	0.6571	0.7956	0.4583
Log likelihood ratio	2.0544	0.3580	0.9237	0.6301	1.7163	0.4239
Wald	1.9119	0.3844	0.8486	0.6542	1.5911	0.4513

Those results suggest the successful effect of central bank monetary policy communication as a primary source on the inflation expectation in Indonesia. The text readability and tone plays an important role in reducing asymmetric information. The economic agents consider all central bank announcements about monetary policy as news instead of noise. Supported by the role of media (printed and visual) as a secondary source of information who process the

complex policy reports with the help of experts and publish and possibly influence the expectation. The learning process of the available information encourages the agents to constantly update their expectations (Orphanides and Williams, 2005). The central bank consistency in announcing monetary policy in advance will strengthen credibility in the long run. Our findings also support the point made in Lucca and Trebbi (2011) in the context of formal communication. The quality of the central bank announcement should not be omitted when identifying monetary policy shocks in the standard monetary models.

5 Concluding Remarks

Effective monetary policy communication designed by a central bank is a key instrument for sufficiently managing price expectations and strengthening the inflation-targeting framework. This paper examined the textual aspects of monthly monetary policy communiqués released by the Central Bank of Indonesia for the last three years. We find that the text readability is relatively stable, although the text complexity is higher, so to understand the texts requires a high level of education. However, the subjects concerning monetary policy, banking, and macroeconomic performance were prominent, reflecting the central bank's concern about the trend of domestic economic recession recorded during the last few years.

The increased intensity of Bank Indonesia's communications over the past three years has succeeded in improving the transparency of monetary policy. The relatively low monthly actual inflation rate in recent years may be associated with the market player's belief in the central bank's commitment to preserving the inflation rate target. However, the quality of central bank communications has a different effect on the inflation expectations. The 6- and 12-month-ahead inflation expectations are more responsive to the readability and tone of the central bank announcement, compared to the 3-month-ahead one. In turn, this provides not only additional improvement in shaping inflation expectations in the future but also improves the transmission mechanism to the real economic sectors.

It means that the possibility of inflation uncertainty in the future is still open. The results of this empirical study provide benefits as an early warning system in the formation of public inflation expectations. In order to reduce the uncertainty of future inflation behavior, it is not sufficient just to increase the intensity of communication about the policy. The provision of congested information in the communication has also to be coupled with the increase in clarity of the announcements issued. Overall, they may suggest that policymakers and market observers should also pay more attention to the informal communication channels, such as speeches by central bank officials, rather than the formal ones, such as reports and minutes.

Further research could be devoted to explore the empirical relationship between central bank monetary policy communication and other relevant macroeconomic variables, i.e. the exchange rates, stock market returns, and economic growth. The purpose of text-based analysis of central bank monetary policy communication (such as the sentiment score) can also be investigated to improve the predictive power of monetary policy.

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