Binus Business Review, 14(2), July 2023, 185−192
DOI: 10.21512/bbr.v14i2.8821
P-ISSN: 2087-1228
E-ISSN: 2476-9053

The Challenging Time for Indonesia Government Bond During Covid-19 Pandemic

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Received: 4th August 2022/ **Revised:** 2nd April 2023/ **Accepted:** 3th April 2023

How to Cite: Mulyono. (2023). The Challenging Time for Indonesia Government Bond During Covid-19 Pandemic. *Binus Business Review, 14*(2), 185−192. https://doi.org/10.21512/bbr.v14i2.8821

ABSTRACT

The Covid-19 pandemic has hit various countries and impacted the bond market. The research aimed to analyze the effect of the Covid-19 pandemic on government bond yields. The research contributed to developing a study on the influence of the Covid-19 outbreak on the bond market. Using an event study allowed observers to measure the impact of a particular event on financial securities. The method used was a differential test on a paired sample that tested the yield of government bonds before and after the announcement of the Covid-19 pandemic. The sample data used were the yields of government bonds at the end of 2019 and 2020. The research also used a selection of government bond yields in the Indonesia Bond Market Directory issued by the Indonesia Stock Exchange. The results show a significant influence of the Covid-19 pandemic on government bond yields. All government bond yields sampled decrease. The most significant decline occurs in government bonds with a maturity period of 1 to 5 years. The research concludes that the Covid-19 pandemic has had a significant effect on reducing the yield of government bonds. Hence, it is recommended that the government keep low-interest rates in the short term so that the yield on government bonds with maturity in the short term remains stable.

Keywords: government bond yields, Covid-19 pandemic, financial securities

INTRODUCTION

The Coronavirus disease 2019 (Covid-19) pandemic that began in 2019 was declared a global pandemic by the World Health Organization (WHO) on March 12, 2020. Then, the Indonesian government designated the Covid-19 outbreak as a national disaster on March 14, 2020. The determination of the status of Covid-19 as a global pandemic and national disaster has influenced the social and economic life of the people in Indonesia. Specifically, the damage caused by the Covid-19 pandemic to society and the economy has surpassed the 2008 global financial crisis. In addition, the Covid-19 pandemic has also created massive systematic risks that make it difficult for investors to find safe havens (Wei & Han, 2021).

The weakening of economic growth in various countries worldwide in 2019 was followed by shocks in the real economy caused by the Covid-19 pandemic in the first quarter of 2020. The pandemic situation at an alarming pace triggers economic weakness in developed countries, which disrupts all major economic sectors. The economic downturn in these countries has resulted in the World Bank predicting that the global economy contracted by 5,2% year on year in 2020. As a result, it has been seen that the global recession has been the deepest since the Second World War (Indonesia Stock Exchange, 2020).

Indonesia's economic growth has also decreased. Based on data from BPS - Statistics Indonesia (2021) in 2019, economic growth was 5,02%. Additionally, in 2020, the economy decreased by -2,07%. As a result, stock trading on the Indonesia Stock Exchange also decreased. During 2020, the Jakarta Composite Index (JCI) fell by -5,09%. In addition to affecting the stock market, the Covid-19 pandemic has significantly affected the state of the bond market, impacting the timeframe and spread of government bonds that are increasingly widening (Zaremba et al., 2022).

Since Covid-19 is designated as a global pandemic, almost all major central banks have responded by implementing unconventional monetary

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policies to ease the pressure on financial markets. Such policies include providing liquidity to the financial system and lowering interest rates (Sever et al., 2020). A lower short-term interest rate policy can be attributed to decreased government bond yields. Therefore, monetary policy actions taken by the government are the main drivers of long-term interest rates, affecting the yield curve (Akram & Al-Helal Uddin, 2022).

Interest rates at several central banks have decreased. For example, the interest rate of the central bank of the United States fell from the level of 1,50%−1,75% in 2019 to 0%−0,25% in 2020. The interest rate of the central bank of England also decreased from 0,75% in 2018 to 0,10 in March 2020. The benchmark interest rate set by Bank Indonesia also decreased. The BI-7 Day benchmark interest rate at the end of 2019 was 5%. Then at the end of 2020, it was at the level of 3,75%. According to Elgin et al. (2021), countries with more independent central banks have a more limited monetary policy and reserve requirement ratios. Governments with more independent monetary authorities adopt a larger package of macro-finance and fiscal policies.

Moreover, the Covid-19 pandemic causes various difficulties in financial markets in response to the United States central bank to support economic activities. Lowering interest rates has important policy implications for policymakers and managers of bond issuers because it can reduce corporate borrowing costs, stimulate economic growth, increase liquidity, and contribute to bond yield spreads. Some evidence related to the effectiveness of policies in calming the market for regional bonds is presented by Wei and Yue (2020). The approach of emergency loan facilities from the central bank has helped reduce fluctuations in the market and provided general stability to financial markets.

The global pandemic caused by Covid-19 has significantly impacted the health sector and international financial markets. Governments in various countries take economic policies that support the recovery of the bond and stock markets. It deals with the mechanism of the impact of Covid-19 on the bond market and stock market, as well as economic policy responses to overcome the effect of the pandemic (Liu et al., 2022). The Covid-19 pandemic has a greater influence on the stock market than its impact on the bond market. Besides, the economic policies pursued by governments in various countries positively affect the bond and the stock market.

Before the pandemic, international rating agencies, such as Standard & Poor's, Fitch Ratings, and Moody's, have given investment-grade ratings for debt securities issued by the Indonesian government. Then, not long after Covid-19 is declared a global pandemic, Standard & Poor's has reviewed the rating from the previous BBB (Stable) to BBB (Negative). Ranking data from several rating agencies can be seen in Table 1.

Bond ratings are concerned with the reputation and financial health of the bond issuer. Investment grade bonds have a minimum rating of BBB- (BBB negative). Bond ratings indicate the risk scale of the bonds being traded. The lowest rating is D, while the highest is AAA. The higher the rating suggests, the lower the risk of default on bonds is and indicates a heightened ability to pay interest and repay the principal of bonds (Mulyono & Saraswati, 2020).

The government bond issuance value controls most bond issuance on the Indonesia Stock Exchange. For example, the value of government bond issuance on the Indonesia Stock Exchange was 78,20% in 2019.

Table 1 Indonesia's Sovereign Rating

Rating Agency	Rating before pandemic	Rating during pandemic
Standard & Poor's	BBB (Stable)	BBB (Negative)
	(May 2019)	(April 2020)
Fitch Ratings	BBB (Stable)	BBB (Stable)
	(March 2019)	(August 2020)
Moody's	Baa2 (Stable)	Baa2 (Stable)
	(April 2018)	(February 2020)

(Source: Indonesia Stock Exchange, 2020)

Table 2 Bond Issuance Value Proportion

Issuer	2019		2020	
	Value	%	Value	%
Government	445,76	78,20	446,24	94,07
Corporate	124,30	21,80	28,15	5,93

(Source: Indonesia Stock Exchange, 2020)

Then, it increased to 94,07% in 2020. The portion of the value of government bonds compared to corporate bonds can be seen in Table 2.

The yield on 10-year government bonds can be used as a benchmark for economic indicators. The yield serves as a benchmark that provides an overview of a country's general interest rate scenario. The yield on the 10-year US Treasury is an indicator of investor sentiment regarding economic developments. Moreover, the decline in the US 10-year Treasury yields provides an overview of the instability in financial markets and the global economy. In contrast, the increase in the 10-year US Treasury yields signals a decline in demand for government bonds (Nagarakatte & Natchimuthu, 2022).

The Covid-19 pandemic has caused economic concern and financial market turmoil in developed and developing countries. As measured by the default swap spread, credit risk has increased significantly after the Covid-19 pandemic, and the effect is more pronounced on short-term credit risk (Hao et al., 2022). Furthermore, the research results from Leippold and Matthys (2022) show that higher policy uncertainty leads to a significant decrease in bond yields and an increase in bond yield volatility.

The implemented macroeconomic policies play an important role in stabilizing financial markets during the pandemic. The impact of monetary policy announcements on government bond yields is greater than on stock market and exchange rate yields (Grabowski et al., 2023). Government bonds have become a safe investment during the Covid-19 pandemic. Investors use government bonds to hedge against fluctuations and increased risk in financial markets since the Covid-19 pandemic has had a negative impact on yields on government bonds traded in developing countries. Therefore, policymakers should focus on measures to reduce pressure on financial markets and the impact of the pandemic on economic fluctuations (Zhou & Meng, 2023).

Several researchers have studied this topic. According to Boukhatem et al. (2021), there are three findings on macroeconomic stability and the bond market in East Asia. First, the interaction between macroeconomic variables and bond markets is more pronounced in developing than developed countries. Second, the relationship between macroeconomic indicators and the bond market during periods of turmoil suggests that the relationship is observed in the short and medium term in developing countries in East Asia. Third, there are differences concerning the degree of fluctuation of macroeconomic indicators.

Previous research by Becker and Benmelech (2021) shows that the bond market can withstand the fluctuations caused by the Covid-19 pandemic. It results in three conclusions. First, bond issuance increases when there are fluctuations in financial markets. On the contrary, the issuance of syndicated loans decreases. Second, central bank interventions have increased bond issuance, while loan issuance has also experienced a little increase. Third, bond issuance concentrates more on bonds with an investment grade rating. Previous research also concludes that the bond market is an essential source of company funding.

Based on El-Khatib and Samet (2021), the Covid-19 pandemic has dealt a hard blow to the financial markets of developing countries, resulting in a sharp decline in stock market indices, increased premiums on sovereign credit default swaps, and an increase in the level of volatility in financial markets. Moreover, the factors affecting the interest rate spread on corporate bond loans are studied (Li & Zhang, 2022). It shows that macro factors, namely risk-free interest rates, liquidity risk, and interest rate risk, impact the distribution of corporate bond loans.

A previous study by To et al. (2022) shows an analysis of the impact of containment measures during the Covid-19 pandemic on bond market volatility in countries that are hit the hardest during the pandemic. Its findings contribute to the literature on the impact of the Covid-19 pandemic on global bond markets. Moreover, it shows that the non-pharmaceutical interventions implemented negatively affect and increase volatility in the bond market. Still, mass vaccination has a positive impact that increases investors' confidence in the global bond market.

Research on corporate bonds conducted by Nozawa and Qiu (2021) discusses the reaction of corporate credit spreading to monetary policies issued by the Federal Reserve. It finds evidence that the bond market is segmented by credit rating. The initial reaction is different according to different credit ratings, but the response is spread across various sectors of corporate bonds over a longer period. In addition, the risk of default is reduced due to implementing the corporate bond repurchase program.

The research of yield curves is an essential topic in finance. Fluctuations in the yield curve are informative for economic activity and an alternative indicator for analyzing monetary policy shocks (Olson et al., 2022). Moreover, the yield curve relates to the interest rates prevailing in an economy for bonds with different maturities. Therefore, modeling the yield curve is necessary for forecasting the market price of a bond (Kumar, 2022).

The researcher contributes to developing research on the influence of the Covid-19 outbreak on the bond market. It aims to provide evidence of the impact of the Covid-19 pandemic on the yield of bonds issued by the government. It examines the effect before and after the government's determination of the Covid-19 outbreak as a national disaster on the yield of bonds issued. The hypotheses proposed are as follows.

H0 : The Covid-19 pandemic has not affected government bond yields significantly.

H1 : The Covid-19 pandemic has affected government bond yields significantly.

METHODS

The research applies an event study. An event study describes empirical financial research techniques that allow observers to measure the impact of a particular event on financial securities. In the event study, an analysis is carried out using changes in the price of financial assets and the time around the announcement date of an event and measuring the impact on the financial market (Rebucci et al., 2022).

Government bonds yield is the rate of return that an investor will receive from bonds if the investor owns the bonds until maturity (yield to maturity). The yield data are secondary data obtained from the Indonesian Bond Market Directory issued by the Indonesia Stock Exchange. Moreover, the Indonesian government designated the Covid-19 pandemic as a national disaster is March 14, 2020. So, the data are the yield of government bonds at the end of 2019, and the end of 2020 for data before and after the Covid-19 pandemic is determined as a national disaster by the Indonesian government.

Moreover, government bonds are securities in the form of debt recognition letters denominated in Indonesian Rupiah and foreign currencies that guarantee interest and principal payments by the Republic of Indonesia following their validity period. The purpose of issuing Surat Utang Negara (SUN or Government Bonds) is to finance the state budget deficit, cover short-term cash shortfalls, and manage the national debt portfolio. Bonds issued by the government are investment instruments that are free of default risk because the government guarantees the payment of principal and coupon interest on bonds. The trading of bonds is carried out on the Indonesia Stock Exchange. The government bond data used can be seen in Table 3. The data classification is secondary data obtained from the Indonesia Bond Market Directory published in 2019 and 2020. The government bonds used are fixed rate bonds (FR), Islamic fixed rate bonds (IFR), retail government bonds (ORI), project-based bonds (PBS), and retail state bonds (SR).

RESULTS AND DISCUSSIONS

The normality test is carried out to determine whether the data have a normal distribution. In line with research from Mishra et al. (2019), the Kolmogorov-Smirnov test can be used to perform a normality test with a minimum sample size of 50 continuous data. The data have a normal distribution if the probability value is more significant than 0,05. Meanwhile, if the probability value is smaller than 0,05, the data do not have a normal distribution. Next, there is a hypothesis test. As a result of decision-making, if the probability

Table 3 Government Bond Data

No.	Bond Series	No.	Bond Series	No.	Bond Series
1	FR0031	18	FR0057	35	IFR0006
2	FR0034	19	FR0058	36	IFR0007
3	FR0035	20	FR0059	37	IFR0010
4	FR0037	21	FR0061	38	ORI014
5	FR0039	22	FR0062	39	PBS002
6	FR0040	23	FR0063	40	PBS003
7	FR0042	24	FR0064	41	PBS004
8	FR0043	25	FR0065	42	PBS005
9	FR0044	26	FR0067	43	PBS007
10	FR0045	27	FR0068	44	PBS011
11	FR0046	28	FR0070	45	PBS012
12	FR0047	29	FR0071	46	PBS014
13	FR0050	30	FR0072	47	PBS015
14	FR0052	31	FR0073	48	PBS017
15	FR0053	32	FR0074	49	PBS018
16	FR0054	33	FR0075	50	SR010
17	FR0056	34	FR0076		

Table 4 Test of Normality

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Before-After	0,182	50	0,000

value is smaller than 0,05, the null hypothesis (H0) is rejected. The normality test results presented in Table 4 state that the probability value is less than 0,05. Hence, the data do not have a normal distribution.

Government bond yield data from the Indonesia Bond Market Directory is processed using SPSS statistics software. Data on government bond yield are presented in Table 5. Bond yield data in 2019 and 2020 were from FR, IFR, ORI, PBS, and SR.

Based on the descriptive statistics analysis results in Table 6, the government bond yield amounts to 50 data. The average yield in 2019 was 7,37%, which decreased in 2020 to 6,16%. The minimum and maximum bond yields in 2019 were 6,25% and 8,41%, respectively. Meanwhile, for 2020, the minimum and maximum bond yields were 2,88% and 7,73%, respectively.

Based on the bond yield rank analysis in Table 7, there is no bond yield data with positive ranks and ties. All yields of 50 government bonds decrease with a mean rank of 25,50, and sum of ranks is 1275. However, all bond yields in 2020 were lower than those in 2019, with negative ranks totaling 50 samples. Before and after the pandemic, bond yields have experienced a decline, as shown by all bond yields experiencing negative ranks.

Table 5 Government bond yield

Bond Series	Yield (%)		Bond Series	Yield (%)	
	2019	2020		2019	2020
FR0031	6,25	2,88	FR0067	8,06	7,70
FR0034	6,38	3,56	FR0068	7,74	7,47
FR0035	6,58	4,40	FR0070	6,87	5,67
FR0037	7,21	6,21	FR0071	7,52	6,97
FR0039	6,78	5,08	FR0072	7,82	7,56
FR0040	7,09	5,90	FR0073	7,64	7,12
FR0042	7,30	6,43	FR0074	7,72	7,26
FR0043	6,60	4,46	FR0075	7,71	7,53
FR0044	6,95	5,55	FR0076	8,09	7,42
FR0045	7,93	7,53	ORI014	6,40	2,90
FR0046	6,77	5,04	IFR0006	7,59	6,91
FR0047	7,36	6,57	IFR0007	7,03	5,59
FR0050	7,96	7,56	IFR0010	7,88	7,49
FR0052	7,58	6,87	PBS002	6,77	4,28
FR0053	6,40	3,65	PBS003	7,63	6,56
FR0054	7,65	7,14	PBS004	8,22	7,50
FR0056	7,21	6,09	PBS005	8,37	7,50
FR0057	8,08	7,73	PBS007	8,01	7,58
FR0058	7,71	7,32	PBS011	6,93	5,16
FR0059	7,28	6,54	PBS012	7,90	7,18
FR0061	6,56	4,34	PBS014	6,68	3,61
FR0062	8,03	7,61	PBS015	8,41	7,60
FR0063	6,74	4,95	PBS017	7,44	5,72
FR0064	7,39	6,72	PBS018	7,78	6,76
FR0065	7,76	7,20	SR010	6,55	3,76

Table 6 Descriptive Statistics of Bond Yield in 2019 and 2020

	N	Mean	Std. Deviation	Min.	Max.
Before	50	7,37	0,59	6,25	8,41
After	50	6,16	1,45	2,88	7,73

The hypothesis test results using the Wilcoxon sign rank test have a Z value of -6,15 with a p-value of 0,00 < 0,05. The data for the hypothesis test with a dependent sample also do not have a normal distribution using the Wilcoxon signed rank test. Therefore, the hypothesis test concludes that H0 is rejected. Hence, H1 is accepted that the Covid-19 pandemic significantly affects the yield of government bonds. The results of the hypothesis test are presented in Table 8.

The bond market in Indonesia is shocked by the Covid-19 pandemic, which results in less conducive economic conditions. It made Bank Indonesia lower the benchmark interest rate by 100 basis points from the 5,00% interest rate in early 2020 to 4,00% in July 2020. In Figure 1, it can be seen that all bond yields have decreased. The most significant decline occurred in government bonds in a period of 1 to 5 years, has an average decrease of 2,26%. Meanwhile, for a period of 6 to 10 years, the average difference in yield is 1,07%. Government bonds with a term above ten years have the smallest average difference in decline of 0,49%.

In 2020, Bank Indonesia took a policy by lowering the benchmark interest rate. In January 2020, the benchmark interest rate was 5,00%. During that year, there were several reductions in the interest rate. So, in December 2020, it became 3,75%. The movement of the central bank's benchmark interest rate can be seen in Figure 2.

Reducing the benchmark interest rate is the government's response to anticipate declining economic growth through the central bank. The central bank can influence government bond yields through interest rate policies. Lower benchmark interest rates lead to lower government bond interest rates (Akram, 2022; Canetg & Kaufmann, 2022).

Table 7 Bond Yield Rank Analysis

		N	Mean Rank	Sum of Ranks
After – Before	Negative Ranks	50	25,50	1275,00
	Positive Ranks	0	0,00	0,00
	Ties	0		
	Total	50		

Table 8 Hypothesis Test Results

	After - Before
Z	-6,15
Asymp. Sig. (2-tailed)	0,00

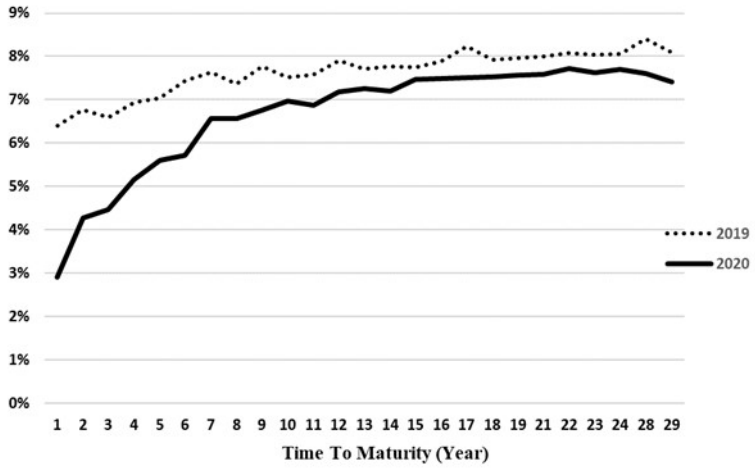

Figure 1 Government Bond Yield in 2019−2020

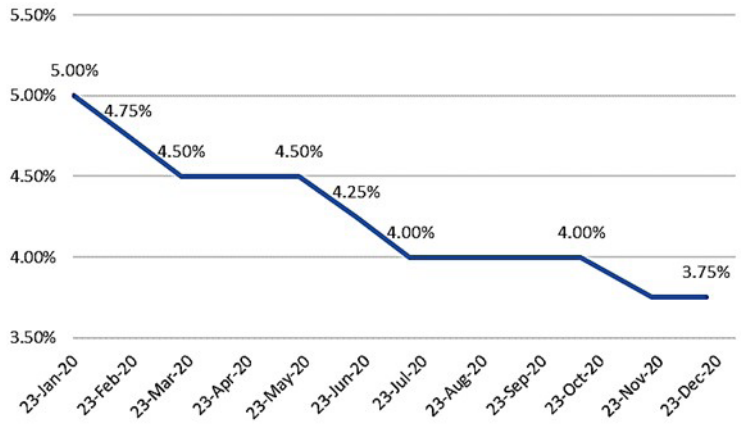

Figure 2 Bank Indonesia's Interest Rate Benchmark

Government monetary stimulus, both conventional and unconventional, reduces yields, especially during the financial crisis. So, fluctuations in interest rates show an effect on bond returns (Van Binsbergen et al., 2022).

The increase in economic risk resulting from the policy of limiting community activities because the pandemic has prompted commercial banks to adopt policies to tighten the terms of loans. The monetary policy pursued by the central bank is quite loose at the start of the pandemic to anticipate a decline in demand for credit by gradually lowering interest rates. Even though the policy to reduce interest rates has been taken, the value of credit financing for households and companies remains below the value of credit financing in 2019 (Danilowska, 2021).

CONCLUSIONS

The Covid-19 pandemic has hit various countries worldwide and caused social and economic shocks. Moreover, government policies, such as lockdowns and restrictions on social activities, to reduce the spread of Covid-19 have dealt a severe blow to the economy. The Covid-19 pandemic affects the decline in domestic economic growth and causes a decrease in world economic growth. Specifically, the impact of Covid-19 has also been felt in financial markets, such as the stock and bond markets. During 2020, the interest rate benchmark decreased, and the government lowered interest rates to respond to fluctuations in financial markets and stabilize financial markets. In the bond market, the impact of Covid-19 causes a decrease in yields on government bonds. Hence, the government has adopted a policy of lowering the benchmark interest rate to support the economy's pace.

Government bond yields experience a significant decrease after the announcement of the Covid-19 pandemic. All government bonds sampled have a reduction in yield. The Covid-19 pandemic has more impact on government bonds with a short-term maturity than for the long term. The biggest decline happens in government bonds with a maturity period of 1 to 5 years, about 2,26%. Meanwhile, for more extended periods over 10 years, it falls to 0,49%. The hypothesis test also shows that the Covid-19 pandemic significantly affects the yield of government bonds. Hence, the government is expected to keep low-interest rates in the short term so that the yield on government bonds with maturity in the short term remains stable.

The limitation of the research is that it only uses data on government bond yields. So, the researchers can use corporate bond yield data with an investment grade rating for further research. Using investment grade ratings can add insight into the quality of corporate bonds used in research.

REFERENCES

Akram, T. (2022). A simple model of the long-term interest rate. *Journal of Post Keynesian Economics*, *45*(1), 130–144.

Akram, T., & Al-Helal Uddin, S. (2022). The empirics of long-term Mexican government bond yields. *Macroeconomics and Finance in Emerging Market Economies,* 1–23.

Becker, B., & Benmelech, E. (2021). *The resilience of the US corporate bond market during financial crises* (Working paper). National Bureau of Economic Research.

Boukhatem, J., Ftiti, Z., & Sahut, J. M. (2021). Bond market and macroeconomic stability in East Asia: A nonlinear causality analysis. *Annals of Operations Research*, *297*, 53–76.

BPS - Statistics Indonesia. (2021). *Statistik Indonesia 2021*. Retrieved from https://www.bps.go.id/publication/2021/02/26/938316574c78772f279b477/statistik-indonesia-2021.html

Canetg, F., & Kaufmann, D. (2022). Overnight rate and signalling effects of central bank bills. *European Economic Review*, *143*(April), 1–15.

Danilowska, A. (2021). The impact of the COVID19 pandemic on the credit market in Poland. *European Research Studies Journal*, *24*(3), 229–240.

Elgin, C., Yalaman, A., Yasar, S., & Basbug, G. (2021). Economic policy responses to the COVID-19 pandemic: The role of central bank independence. *Economics Letters*, *204*(July), 1–8.

El-Khatib, R., & Samet, A. (2021). *The COVID-19 impact: Evidence from emerging markets*. Retrieved from https://ssrn.com/Abstract=3685013

Grabowski, W., Janus, J., & Stawasz-Grabowska, E. (2023). The COVID-19 pandemic and financial markets in Central Europe: Macroeconomic measures and international policy spillovers. *Emerging Markets Review*, *54*(March), 1–26.

Hao, X., Sun, Q., & Xie, F. (2022). The COVID-19 pandemic, consumption and sovereign credit risk: Cross-country evidence. *Economic Modelling*, *109*(April), 1–13.

Indonesia Stock Exchange. (2020). *Indonesia bond market directory 2020*. PT Bursa Efek Indonesia.

Kumar, S. (2022). *Harvesting the yield curve mispricing: Evidence from the Indian government bond market.* Indian Institute of Management Calcutta.

Leippold, M., & Matthys, F. (2022). Economic policy uncertainty and the yield curve. *Review of Finance, 26*(4), 751–797.

Li, S. S., & Zhang, M. A. (2022). A review of the influence factors of corporate bond credit spread. *Journal of Economics, Business and Management*, *10*(2), 124–127.

Liu, F., Kong, D., Xiao, Z., Zhang, X., Zhou, A., & Qi, J. (2022). Effect of economic policies on the stock and bond market under the impact of COVID-19. *Journal of Safety Science and Resilience*, *3*(1), 24–38.

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anesthesia*, *22*(1), 67–72.

Mulyono, & Saraswati, N. (2020). *Investasi dan pasar modal*. Manggu Makmur Tanjung Lestari.

Nagarakatte, S. G., & Natchimuthu, N. (2022). Impact of Brexit on bond yields and volatility spillover across France, Germany, UK, USA, and India's debt markets. *Investment Management and Financial Innovations*, *19*(3), 189–202.

Nozawa, Y., & Qiu, Y. (2021). Corporate bond market reactions to quantitative easing during the COVID-19 pandemic. *Journal of Banking & Finance*, *133*(December), 1–20.

Olson, E., Valcarcel V. J., & Wohar M. (2022). *Yield curve shocks: Identification and information sufficiency*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4160051

Rebucci, A., Hartley, J. S., & Jiménez, D. (2022). An event study of COVID-19 central bank quantitative easing in advanced and emerging economies. In A. Chudik, C. Hsiao, & A. Timmermann (Eds.), *Essays in honor of M. Hashem Pesaran: Prediction and macro modeling* (Vol. 43, pp. 291–322). Emerald Publishing Limited.

Sever, C., Goel, R., Drakopoulos, D., & Papageorgiou, E. (2020). Effects of emerging market asset purchase program announcements on financial markets during the COVID-19 pandemic. *IMF Working Papers, 2020*(292), 1–20.

To, B. C. N., Nguyen, T. V. T., Nguyen, N. T. H., & Ho, H. T. (2022). Responses of the international bond markets to COVID-19 containment measures. *Journal of Risk and Financial Management*, *15*(3), 1–11.

Van Binsbergen, J. H., Diamond, W. F., & Grotteria, M. (2022). Risk-free interest rates. *Journal of Financial Economics*, *143*(1), 1–29.

Wei, B., & Yue, V. Z. (2020). The Federal Reserve's liquidity backstops to the municipal bond market during the COVID-19 pandemic. *Policy Hub*, 1–10.

Wei, X., & Han, L. (2021). The impact of COVID-19 pandemic on transmission of monetary policy to financial markets. *International Review of Financial Analysis*, *74*(March), 1–11.

Zaremba, A., Kizys, R., Aharon, D. Y., & Umar, Z. (2022). Term spreads and the COVID-19 pandemic: Evidence from international sovereign bond markets. *Finance Research Letters*, *44*(January), 1–6.

Zhou, S., & Meng, X. (2023). Are government bonds still safe havens in the context of COVID-19? *Applied Economics Letters*, *30*(1), 14–18.