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Exchange rate responses to macroeconomic announcement on the COVID-19 pandemic

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A B S T R A K

Penelitian ini dilakukan untuk menguji bagaimana pengaruh kemunculan pengumuman indikator makroekonomi terhadap perubahan nilai tukar USD/IDR sebelum dan selama pandemi COVID-19, serta mengetahui perbedaan dampak pengumuman ekonomi makro yang bersifat positif dengan yang bersifat negatif terhadap nilai tukar. Untuk mengukur kemunculan pengumuman indikator makro ekonomi digunakan surprise component yaitu perbedaan antara data aktual dengan perkiraan pasar dari indikator makroekonomi. Penelitian ini menggunakan data time series harian dari 01 Januari 2014 sampai dengan 30 November 2020. Data aktual dan perkiraan pasar dari masing-masing indikator makroekonomi diperoleh dari Bloomberg. Untuk menguji respon nilai tukar USD/IDR terhadap pengumuman makro ekonomi digunakan metode analisis Ordinary Least Square (OLS) dengan heteroskedasticity and autocorrelation consistent (HAC). Penelitian ini menemukan bahwa selama pandemi COVID-19, nilai tukar USD/IDR menjadi lebih sensitif terhadap surprise component dari pengumuman indikator makroekonomi dibandingkan dengan periode sebelum pandemi COVID-19. Penelitian ini juga menemukan bukti bahwa berita positif Indonesia dan berita negatif Amerika Serikat berpengaruh signifikan terhadap perubahan nilai tukar USD/IDR.

A B S T R A C T

This study examines the effects of macroeconomic announcements on the USD/IDR exchange rate before and during the COVID-19 pandemic, and the difference between the impact of positive and negative announcements on the exchange rate. To measure the macroeconomic announcement, a surprise component is used, that is the difference between actual data and market forecasts. The data in this research are daily time series from 1 January 2014 to 30 November 2020. The actual data and market forecasts for each indicator are obtained from Bloomberg. To test

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the exchange rate response to the macroeconomic announcement, the Ordinary Least Square (OLS) analysis method is used with heteroskedasticity and autocorrelation consistent (HAC). This study finds that during the COVID-19 pandemic, the USD/IDR exchange rate is more sensitive to the surprise component of the macroeconomic announcement compared to the period before the COVID-19 pandemic. This research also finds evidence that positive Indonesian news and negative US news have a significant effect on changes in the USD/IDR exchange rate.

INTRODUCTION

The exchange rate appreciates and depreciates over time. Like other asset prices, supply and demand for exchange rates are influenced by any information available in the market. The foreign exchange market is the largest financial market in the world. Based on the Triennial Central Bank Survey conducted by the Bank for International Settlement (BIS), in 2019 trading in the foreign exchange market reached an average of 6.6 billion dollars per day, this number increased compared to 2016 which reached an average trade of 5.1. billion dollars per day (Bis.org, 2019). Market participants have various motives for trading in the foreign exchange market. Banks, financial institutions, and individual investors trade in the foreign exchange market with speculative motives, the central bank intervenes in the market to maintain the stability of currency exchange rates, corporations trade currency for global business operations and to hedge risk. With these various motives, it is very important for market participants to predict how the exchange rate will change. Changes in exchange rates can occur for various reasons, one of them is the emergence of information available in the market.

How information affects the exchange rate is still an interesting issue to discuss. The efficient market hypothesis (EMH) stated that all available information at time (t) is incorporated into the price at that time, and prices react directly to any new information (Read, 2013). Based on this hypothesis, the exchange rate will be influenced by any available information, including macroeconomic releases. In this study, we examine how macroeconomic releases affect exchange rates.

There have been many studies on how information affects exchange rates (Gbadebo *et al*., 2021; Omrane & Savaşer, 2016). However, most of the literature has been examined using currency pairs of developed countries. Literature tested the EMH for currency pairs from developing countries, such as the Indonesian rupiah (IDR), is limited. This study is expected to contribute to the efficient market hypothesis (EMH) study on the effect of macroeconomic announcements on the exchange rate.

This research refers to a research conducted by Cheung *et al*. (2019); Ehrmann & Fratzscher (2005) to examine how the USD/IDR exchange rate response to the surprise component of the macroeconomic announcement. Previous studies found that several macroeconomic announcements have a significant effect on exchange rates

(Cheung *et al*., 2019; Faust *et al*., 2007; Galati & Ho, 2001; Hashimoto & Ito, 2010). Cheung *et al*. (2019); Hashimoto & Ito (2010) researched how the JPY/USD exchange rate was affected by macroeconomic announcements during the pre-crisis, crisis, and post-crisis. They found that the US macroeconomic announcements were more significant in the post-crisis period than the pre-crisis period. Where the significance of the post-crisis news is greater than the pre-crisis news period. As for the Japanese macroeconomic announcements, it was found that during the crisis and afterward, some macroeconomic news from Japan had no significant effect on the JPY/USD exchange rate.

Our research is aimed at examining how the USD/IDR exchange rate responds to the shock component of the macroeconomic announcements before and during the COVID-19 pandemic. The COVID-19 pandemic has caused the world economy to decline. This pandemic has caused most financial securities, commodity prices, and economic growth to fall sharply (Ali *et al*., 2020; Fernandes, 2020; Salisu *et al*., 2020; Singh *et al*., 2020; Vitenu-Sackey & Barfi, 2021). Kose *et al.* (2020) said that the pandemic caused financial markets to become extremely volatile, equity markets around the world fell, and commodity prices fell sharply because of falling global demand, all reflecting the high uncertainty in the world economy. This condition will certainly affect the efficiency of the foreign exchange market. Given the severe economic conditions during the pandemic, it becomes a question whether the pandemic will affect the efficiency of the exchange rate. This study attempts to answer this question by examining the impact of macroeconomic announcements on exchange rates before and during the pandemic period.

The USD/IDR exchange rate is used as the object of this study because the dollar is the most widely used currency in the world. The US dollar is the most commonly reserve currency owned by countries in the world. Besides, the US dollar is the most widely used currency for international trade and other transactions around the world. More than 61 percent of world banks' foreign exchange reserves are in US dollars. Also, from 2016 to 2019, the US dollar was the most traded currency worldwide. This shows the high dependence of world countries on the US dollar currency (see Bis.org, 2019). Similarly, Indonesia is also one of the countries that use the US dollar as foreign exchange reserves in addition to gold.

The approach used in this study is based on the efficient market hypothesis (EMH). In this approach, exchange rate movements are related to the market's ability to process any available information (Mishkin, 2014). An increase or decrease in the exchange rate will be influenced by any information that appears. We use the Ordinary Least Square (OLS) with the Newey-West estimator to find out how the effect of the macroeconomic announcement on the exchange rate.

The estimations show interesting findings where during the COVID-19 pandemic, the USD/IDR exchange rate became more responsive to the

macroeconomic announcement compared to the period before COVID-19. Before the pandemic, there was only one macroeconomic announcement that affected changes in the exchange rate, it is inflation. Meanwhile, there were seven macroeconomic announcements during the pandemic which had a significant effect on the USD/IDR exchange rate.

There are several contributions of this research. First, this research will contribute to the study of the efficient market hypothesis (EMH) in the foreign exchange rate market (Fatum *et al*., 2012; Iyke, 2019). Second, this study provides an overview of how the USD/IDR exchange rate will respond to the emergence of different macroeconomic announcements (Cagliesi *et al*., 2016; Caporale *et al*., 2017; Égert & Kočenda, 2014). Third, this study shows how the macroeconomic announcement affects the USD/IDR exchange rate before and during the COVID-19 pandemic (Aslam *et al*., 2020; Cagliesi *et al*., 2016). Thus, unstable economic conditions due to the pandemic will certainly have an impact on exchange rate efficiency.

LITERATURE REVIEW

Efficient Market Hypothesis

The efficient market hypothesis states that prices reflect all available information, and prices react instantly to any new information that emerges (Voit, 2003). Based on this perspective, prices in the market are shaped by emerging information. So that speculators in the market will look for or wait for a new information to predict price changes that may occur.

The supply and demand for exchange rates will also affect the equilibrium exchange rate, just like the price of other goods. If the foreign exchange rate market is efficient or the efficient market applies, then the exchange rate will change depending on any information available in the market. In other words, any information that market participants have will affect the supply and demand for the currency. The exchange rate of some currency will change if relevant information appears. This information will influence the decision of market participants to buy or sell the currency. When information causes market players to purchase a currency, the demand for that currency will increase, causing appreciation.

The Efficient Market Hypothesis also states that the expectation of future prices is the same as the optimal forecast using currently available information (Mishkin, 2014). In other words, market expectations of the exchange rate rationally are:

$$P^{e}_{t+1} = P^{of}_{t+1} \quad \ldots\ldots 1$$

The equation above implies that the expected return of exchange rate will be equal to the optimal forecast of the return.

Previous Empirical Studies

This study will discuss how the impact of shock from a macroeconomic announcement on exchange rate movements. This study will focus on the question of whether the economic condition as reflected in the macroeconomic announcement is an important factor influencing the USD/IDR exchange rate. This study will also try to examine how the USD/IDR exchange rate has different reactions to positive and negative macroeconomic announcement indicators.

Several studies have been conducted to see how macroeconomic announcements affect the exchange rate market (Beckmann *et al*., 2011; Li *et al*., 2015). Ehrmann & Fratzscher (2005) analyzed the link between exchange rate and economic fundamentals using the weighted least squares (WLS) analysis tool. Ehrmann & Fratzscher (2005) found that the surprise component of the macroeconomic indicators of America, Germany, and the European region became the driving force behind the movement of the EUR/USD and DM/USD exchange rates for the 1993-2003 period. It can also be seen that exchange rate movements are more influenced by macroeconomic indicators from America than Germany and the European region. Furthermore, this study also found that negative news has a greater effect on exchange rate movements than positive news.

Fatum *et al.* (2012) conducted a study on the impact of the macroeconomic announcement on the intraday JPY/USD exchange rate. The analysis tool used is the two-step weighted least squares (2WLS) estimation. For the US announcements, the result shows 12 of the 19 variables are significant with the correct sign, and for Japanese announcements, the result shows six of the 16 Japanese macro news variables are significant with the correct sign. Instead of focusing on the exchange rate, Omrane & Savaşer (2017) examined the effects of macroeconomic news on the volatility of major currency markets (euro-dollar, pound-dollar, and yen-dollar) during the global financial crisis. It is found that volatility response to most news indicators is larger in the expansion period, currency market reaction to the new home sales and Fed funds rate news is larger in the crisis period. Another study that focused on exchange rate volatility is conducted by Lin *et al*. (2020). The study investigated how macro news shocks from the US and China affect the volatility of the exchange rate. This research found that the US macro news plays a more significant contribution in influencing the exchange rate compared to China's macro news.

Gau & Wu (2017) investigated how market-specific contributions to price discovery among the four sequential markets: Asian, European, London + New York (L+NY), and the U.S. surrounding the release of macroeconomic announcements in the United States, Europe, and Japan. Gau & Wu (2017) found that the dominance of the overlapping trading hours of London and New York in the price discovery of the

EUR/USD and USD/JPY markets only applies on days with U.S. announcements.

Cheung *et al*. (2019) researched how the JPY/USD exchange rate was affected by macroeconomic news before, during, and after the global financial crisis. Cheung *et al*. (2019) estimated using OLS with standard errors of heteroscedasticity and consistent autocorrelation (HAC). In this study, it was found that America's macroeconomic news was more significant after the crisis than the pre-crisis period. Where the significance of the news has doubled compared to the pre-crisis period. As for news from Japan, it was found that during the crisis and afterward, some macroeconomic news from Japan had no significant effect on the exchange rate.

The Impact of COVID-19 on Exchange Rate

Research on the impact of COVID-19 on financial markets has increased recently. Some studies have investigated the impact of COVID-19 on the stock market (Latif *et al*., 2021), others investigated the impact of COVID-19 on the bond market (Gubareva, 2021) and investigated the impact of COVID-19 on the foreign exchange market (Pasiouras & Daglis, 2020). Our discussion focuses on how COVID-19 impacts exchange rates.

Gongkhonkwa (2021) conducted research on the impact of COVID-19 on the Thai Baht exchange rate. Gongkhonkwa (2021) found that COVID-19 had a significant effect on exchange rates. The confirmed cases due to COVID-19 caused the depreciation of CNY, MYR, SGD, VND, AUD, and TWD. In addition, an increase in COVID-19 cases had a negative impact on the exchange rate. Benzid & Chebbi (2020) found that death cases caused the depreciation of the JPY, USD, HKD, and VND. They also found that the increase in the number of cases and deaths due to COVID-19 had a positive and significant effect on the exchange rate volatility.

Different from previous research, this research is aimed at examining the impact of macroeconomic announcements during the COVID-19. This study will determine whether the economic condition as reflected in the macroeconomic announcement is an important factor in influencing the exchange rate during the COVID-19 pandemic. In addition, we will also examine how the exchange rate reacts differently to positive and negative macroeconomic announcement indicators. As for the hypothesis in this study, there are:

H1: Macroeconomic announcements had an impact on the USD/IDR exchange rate before and during the COVID-19 pandemic.

H2: Positive and negative news from U.S and Indonesia had an impact on the USD/IDR exchange rate before and during the COVID-19 pandemic.

RESEARCH METHODS

Our approach in this study is to analyse the effect of the macroeconomic announcement on the exchange rate. As with other literature, this study analyses the movement of exchange rates at daily frequencies (Benzid & Chebbi, 2020; Birz & Lott, 2011; Caporale *et al*., 2016; Hayo & Neuenkirch, 2012; Hutchison & Sushko, 2013; Pyo & Lee, 2020). The data consists of the data releases for macroeconomic indicators, reflecting in the real-time information available to the markets every day. In this study, we used data from 01 January 2014 to 30 November 2020. Following the previous literature (Anderson *et al*., 2003; Ehrmann & Fratzscher, 2005) to find out the effect of macroeconomic announcement on the exchange rate, we use shock components of macroeconomic indicators. We use the shock component as the measurement of the macroeconomic announcement.

$$S_{k,t} = \frac{A_{kt} - E_{kt}}{\dot{\sigma}_{kt}} \quad \text{..... 2}$$

where $S_{k,t}$ is the shock component of a macroeconomic indicator k, $A_{k,t}$ is the actual value of the k indicator based on the release of the macroeconomic announcement, $E_{k,t}$ is the market expectation of the indicator k, while $\sigma_{k,t}$ is the standard deviation of Actual data and market forecasts ($A_{k,t}$ - $E_{k,t}$) are obtained from Bloomberg. Bloomberg collects actual data on macro indicators from relevant statistical or economic departments and central banks in each country. Bloomberg regularly surveys economists, commercials, banks, and other financial institutions to gauge their expectations for the macroeconomic announcement. While the forecast data published by Bloomberg comes from the median of the survey.

In this study, we used 20 macroeconomic indicators from Indonesia and United States of America (USA) to find out how the macroeconomic announcement of each country affects USD/IDR. Indonesia's macroeconomic indicators used are exports, imports, trade balance, inflation, interest rates and, GDP. Meanwhile, American macroeconomic indicators used are consumer price index, producer price index, consumer confidence, unemployment rate, industrial production, GDP, retail sales, trade balance, non-farm payroll, manufacture PMI, non-manufacture PMI, crude oil price, jobless claims and new home sales.

To find out how the macroeconomic announcement affects the exchange rate of USD/IDR before and during the COVID-19 pandemic, we used four models. Model 1 is used to determine how the shock component of macroeconomic indicators affects the exchange rate before the pandemic. Model 2 is used to determine how the shock component of macroeconomic indicators affects the exchange rate during the pandemic. Model 3 is used to determine how the shock component of the macroeconomic indicator affects the USD/IDR exchange rate before and during the COVID-19 pandemic. Model 4 is used to measure the effect of positive and negative news on exchange rates. We categorize positive and negative news in this study based

on shock components of macroeconomics indicators that have a positive sign or negative sign on the dollar. The models in this study are as follows:

$$\Delta(lne_t) = \alpha + \sum_{i=1}^{I} \beta_i^{ID} s_{i,t}^{ID} + \sum_{j=1}^{J} \beta_j^{US} s_{j,t}^{US} + \varepsilon_t \quad \text{..... 3}$$

$$\Delta(lne_t) = \alpha + \sum_{i=1}^{I} \beta_i^{ID} s_{i,t}^{ID} + \sum_{j=1}^{J} \beta_j^{US} s_{j,t}^{US} + \varepsilon_t \quad \text{..... 4}$$

$$\Delta(lne_t) = \alpha + \sum_{i=1}^{I} \beta_i^{ID} s_{i,t}^{ID} + \sum_{j=1}^{J} \beta_j^{US} s_{j,t}^{US} + \delta^c cov + \varepsilon_t \quad \text{..... 5}$$

$$\Delta(lne_t) = \alpha + \beta_P^{ID} D_{P,t}^{ID} + \beta_N^{ID} D_{N,t}^{ID} + \beta_P^{US} D_{P,t}^{US} + \beta_N^{US} D_{N,t}^{US} + + \delta^c cov + \varepsilon_t \quad \text{..... 6}$$

Where et is the exchange rate for the USD/IDR, s_(i,t)^ID is the shock component of Indonesia's macroeconomic announcement. s_(j,t)^US is the shock component of the United States macroeconomic announcement. Cov is the dummy variable for COVID-19 period, valued1 during COVID-19 period and 0 otherwise. D_(P,t)^IDis the dummy variable of positive Indonesian news, valued 1 if there is positive Indonesian news and 0 otherwise.D_(N,t)^IDis the dummy variable of negative Indonesian news, valued 1 if there is negative news, and 0 otherwise. D_(P,t)^US is the dummy variable of positive US news, valued 1 if there is positive US news, and 0 otherwise. D_(N,t)^US is the dummy variable of negative US news, valued 1 if there is negative news, and 0 otherwise. ε_tis the error term.

This study analyses how the shock component of macroeconomic news can affect the movement of the USD/IDR exchange rate. The method used in this study refers to the approach used by Anderson *et al*. (2003); Cheung *et al*. (2019). We employ ordinary least square (OLS) with Newey-West estimator or usually called heteroskedasticity and autocorrelation consistent (HAC). OLS with HAC can be used to overcome the possibility of autocorrelation and/or heteroscedasticity problems (see Stock & Watson, 2020). The use of OLS itself has several advantages. First, it is more suitable for the analysis of ceteris paribus, and important for testing an economic theory. Second, the more control variables use in the study (this study uses 20 control variables), the better the variation in the dependent variable can be explained (Wooldridge, 2016). In addition, this study does not employ GARCH or ARCH because it involves a large number of parameters resulting from the inclusion of 22 different macroeconomic announcements in the model. According to Ehrmann & Fratzscher (2005), GARCH or ARCH specifications are not the best method to estimate the econometric equations since a large number of parameters often causes problems in the convergence of the maximum likelihood estimate. Therefore, this study employs OLS HAC to examine the effect of shock component from macroeconomic announcements on the exchange rate before and during pandemic COVID-19.

RESULT

The following are the estimation results using the Ordinary Least Square (OLS) with heteroskedasticity and autocorrelation consistent (HAC) that use 14 US and 6 Indonesian macroeconomic news.

The Effect of Macroeconomic Announcement on Exchange Rates Before the COVID-19 Pandemic

Based on the estimation results shown in Table 1, in Indonesia, there is only one macroeconomic announcement that has a significant effect on changes in the USD/IDR exchange rate. That is the inflation rate that has a negative coefficient at 5 percent of significance level. This shows when the actual inflation that is higher than the expected inflation, the USD/IDR exchange rate declines, or in other words, the IDR is appreciating. The finding supports the research conducted by Simpson *et al*. (2005). If the actual Indonesian inflation is higher than the market expectation, then this is considered a positive signal for market players to increase the demand for IDR. Regarding US, there are several macroeconomic announcements that have significant effects on the USD/IDR exchange rate before the COVID-19 pandemic. This result support the research conducted by Untoro (2007) explaining that the market player will anticipate the macroeconomic announcement from US. As a result, Indonesian market players will be adjusting to the forecast data of US macroeconomic indicators by referring to the forecast data from market players in Singapore, Japan, and London. This, in turn, will give more accurate data projections for the US macroeconomic announcements.

Table 1 shows that the probability of the F-statistic is 0.961, which is greater than the 5 percent significance level. This result suggests that the overall shock components of the macroeconomic announcement do not significantly affect the changes of USD/IDR exchange rate before the COVID-19 pandemic.

Table 1
Estimation result of model 1

	I		II	
Variable	**Indonesia**		**Indonesia**	
	Coefficient	**Standard error**	**Coefficient**	**Standard error**
Inflation	-0.000**	0.000	-0.000**	0.000
Trade Balance	-0.010	0.016	-0.009	0.016
Interest rate	0.007	0.004	0.007	0.004
GDP	0.018	0.012	0.018	0.012
Export	0.001	0.015	0.000	0.015
Import	-0.006	0.020	-0.006	0.020
	United States of America		**United States of America**	
	Coefficient	**Standard error**	**Coefficient**	**Standard error**
CPI	0.002	0.003	0.001	0.003
Trade Balance	0.002	0.003	0.002	0.003
Unemployment rate	0.010	0.009	0.010	0.009
GDP	0.013	0.014	0.013	0.014
Retail sales	0.001	0.007	0.002	0.007
PPI	-0.001	0.008	-0.001	0.008
Industrial production	-0.003	0.008	-0.003	0.008
Consumer Confidence	-0.000	0.007	-0.000	0.007
Nonfarm payroll	-0.004	0.008	-0.004	0.008
Manufacture PMI	-0.007	0.008	-0.007	0.008
Non- Manufacture PMI	-0.001	0.006	-0.001	0.006
New Home sales	0.000	0.008	0.000	0.008
Crude Oil	0.001	0.003	0.001	0.003
Jobless claims	0.002	0.003	0.002	0.003
F *test*				
Prob(F-Statistic)	0.961			

Note: Table 1 presents the results for regression of Model (1). Column I show the estimation results using data before the COVID-19 pandemic based on United states COVID-19 data, from 01 January 2014 to 20 January 2020. Column II shows the results using the COVID-19 pandemic data based on Indonesian data, from 01 January 2014 to 01 March 2020. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

The Effect of Macroeconomic Announcement on Exchange Rates During the COVID-19 Pandemic

Table 2 summarizes the estimation results of the effect of the macroeconomic announcement on the exchange rate during the COVID-19 pandemic using OLS HAC. The table shows quite interesting results where during the COVID-19 pandemic, the USD/IDR exchange rate became more responsive to the shock component of macroeconomic announcement. During the COVID-19 pandemic, there are two Indonesian macroeconomic announcements that have a significant negative effect on the USD/IDR exchange rate. They are trade balance and GDP. The negative relationship suggests that when the actual values of trade balance and GDP are higher than the expected values, the IDR exchange rate will appreciate.

In terms of GDP, the finding in Table 2 is consistent with an economic theory stating a higher GDP indicates that a country's economy is experiencing growth. Countries with high economic growths will attract investors to invest their funds in

those country. Then, this will strengthen the exchange rate. However, during the COVID-19 pandemic, most countries in the world experienced a recession, economic growth in many countries became negative, equity markets fell, and global uncertainty was higher. These conditions cause the market sentiment of the economy to turn negative (Reis & Pinho, 2020; van der Wielen & Barrios, 2021). When the actual value of Indonesia's GDP exceeds the market expectation, this gives a positive signal of Indonesian economy to the market, causing the IDR exchange rate to increase.

Regarding the trade balance, the movement of currency exchange rate is following the supply and demand for the currency though international trade. An increase in trade balance indicates an increase in exports. Higher Indonesian exports indicate an increased demand for domestic goods and this will increase the demand for IDR currency. In the theory of supply and demand, when the demand for domestic goods (exports) is increasing, the price level will increase, and the exchange rate will be appreciated. Conversely, if imports are higher, then the demand for foreign currency will be relatively higher. This leads to the exchange rate depreciation. Therefore, the actual Indonesia's trade balance that is higher than the market expectations tends to encourage market players to increase the demand for IDR.

Table 2 shows five shock components from the US macroeconomic announcements that have significant effects on the changes of USD/IDR exchange rate. They are the consumer price index (CPI), unemployment rate, retail sales, industrial production, and initial jobless claims. Three of them (CPI, unemployment rate and jobless claims) give a positive effect on the USD/ IDR exchange rate, while the other two (retail sales and industrial production) give a negative effect on the USD/ IDR exchange rate. Regarding the positive effect, the increase in the shock component of CPI and initial jobless claims will cause the USD/IDR exchange rate to increase, or in other words, the IDR will depreciate. In terms of the negative effect, when the actual values of retail sales and industrial production are greater than the expected values the IDR will appreciate. These findings are supported by Ehrmann & Fratzscher (2005) suggesting that CPI will cause the USD to appreciate, and also by Anderson *et al*. (2003) suggesting that initial jobless claims have a negative effect, while retail sales and industrial production had a positive effect on the exchange rate of EUR/USD, JPY/USD, DM/ USD, GBP/USD and CHF/USD.

Table 2
Estimation result of model 2

	I		**II**	
Variable	**Indonesia**		**Indonesia**	
	Coefficient	**Standard error**	**Coefficient**	**Standard error**
Inflation	-0.014	0.012	-0.025***	0.008
Trade Balance	-0.008***	0.010	-0.010	0.011
Interest rate	0.013	0.002	0.017***	0.002
GDP	-0.005**	0.002	-0.002	0.002
Export	-	-	-	-
Import	-0.006	0.009	0.002	0.009
	United States of America		**United States of America**	
	Coefficient	**Standard error**	**Coefficient**	**Standard error**
CPI	0.020**	0.009	0.012**	0.006
Trade Balance	-0.001	0.002	-0.003	0.002
Unemployment rate	0.010*	0.006	0.015***	0.005
GDP	0.000	0.003	-0.001	0.002
Retail sales	-0.021***	0.006	-0.023***	0.005
PPI	-0.012	0.008	-0.005	0.006
Industrial production	-0.015**	0.006	-0.014**	0.005
Consumer Confidence	0.013	0.013	0.014	0.013
Nonfarm payroll	0.004	0.003	0.002	0.002
Manufacture PMI	0.004	0.008	0.004	0.007
Non- Manufacture PMI	0.018	0.014	0.014	0.015
New Home sales	0.000	0.005	-0.003	0.005
Crude Oil	0.004	0.006	0.004	0.005
Jobless claims	0.027***	0.004	0.023***	0.003
F test				
Prob(F-Statistic)	0.042**			

Note: Table 2 presents the results for regression of Model (2). Column I show the estimation results using data during the COVID-19 pandemic based on U.S COVID-19 data, from 21 January 2020 to 30 November 2020. Because there is a multicollinearity problem in this model, we eliminate exports. Column II shows the results using the COVID-19 pandemic data based on Indonesian data, from 02 March 2020 to 30 November 2020. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Some possible explanations regarding the results in the CPI, can be clearly seen on how the decision of the Central Bank made in setting policy. If the inflation rate exceeds the target set, the Federal Reserve will raise interest rates to reduce the spending level so that the inflation will be stable again. An increase in the interest rates, on the other hand, will cause the dollar to appreciate compared to other currencies. However, the findings of industrial production and retail sales are not in accordance with the economic theory. Higher industrial production and retail sales indicate an increasing level of industrial growth, and in turn, will increase the total sales. During the COVID-19 pandemic, the economy experienced a recession, productivity and firm performance declined (Shen *et al*., 2020). This causes a negative market sentiment. Hence, when the actual values of these two indicators are greater than the market expectations, the announcements cannot provide a positive signal for the dollar exchange rate. As a result, both announcements weaken the dollar exchange rate. These findings support the results from Anderson *et al*. (2003) suggesting that the

shock components of retail sales and industrial production have a negative effect on the dollar.

During the COVID-19 pandemic, economic conditions have worsened. This causes the exchange rate becomes more volatile ((Banerjee *et al*., 2020; Benzid & Chebbi, 2020). This fact is supported by the results in Table 2 suggesting that the exchange rate become more responsive to macroeconomic announcements during the COVID-19 pandemic compared to the previous period are the effects the exchange rate volatility was higher. This can be seen from the simultaneous test or F-testing Table 2 that the probability of the F-statistic is 0.0421, smaller than the significance level of 5 percent. This shows that simultaneously, the shock components of the macroeconomic announcements during the COVID-19 pandemic have significant effects on the exchange rate. This is because the COVID-19 condition results in panic in the market, market participants worrying the possibility of a financial crisis. Besides, the risk of trade war between the US and China exacerbate this condition. These two factors cause the exchange rate to be more fluctuated and market players to be more responsive to macroeconomic announcements.

The Effect of Macroeconomic Announcement on Exchange Rates Before and During the COVID-19 Pandemic

Model 3 is employed to examine how the macroeconomic announcements affect the exchange rate before and during the COVID-19 pandemic. The estimation includes all the observational data collected to understand how the shock component of the macroeconomic announcements will affect the exchange rates before and during the pandemic. The model uses the COVID-19 dummy variable to capture the effect of COVID-19 pandemic on the exchange rate. Table 3 documents the estimation using model 3.

Based on Table 3, there are two shock components of Indonesia's macroeconomic announcements which have a significant effect on the exchange rate from 01 January 2014 to 30 November 2020. They are inflation and interest rates. Although, the shock component of inflation has a negative and significant effect on the exchange rate, the shock component of interest rates has a positive and significant effect on exchange rates.

Table 3
Estimation result of model 3

	I		II	
Variable	**Indonesia**		**Indonesia**	
	Coefficient	**Standard error**	**Coefficient**	**Standard error**
Inflation	-0.000***	0.000	-0.000***	0.000
Trade Balance	-0.009	0.015	-0.009	0.016
Interest rate	0.007**	0.004	0.007*	0.004
GDP	0.007	0.008	0.008	0.008
Export	0.003	0.014	0.001	0.014
Import	-0.006	0.019	-0.004	0.018
	United States of America		**United States of America**	
	Coefficient	**Standard error**	**Coefficient**	**Standard error**
CPI	0.004	0.003	0.003	0.003
Trade Balance	0.000	0.002	-0.000	0.002
Unemployment rate	0.010	0.007	0.011	0.007
GDP	0.006	0.008	0.004	0.008
Retail sales	-0.000	0.007	-0.000	0.007
PPI	-0.002	0.007	-0.001	0.007
Industrial production	-0.003	0.007	-0.003	0.007
Consumer Confidence	0.001	0.006	0.001	0.006
Nonfarm payroll	-0.003	0.006	-0.004	0.006
Manufacture PMI	-0.005	0.006	-0.005	0.006
Non- Manufacture PMI	0.002	0.007	0.001	0.006
New Home sales	-0.000	0.006	-0.001	0.006
Crude Oil	0.002	0.003	0.002	0.003
Jobless claims	0.005	0.003	0.005	0.003
	Control Variable		**Control Variable**	
Dummy COVID-19	0.090***	0.023	0.099***	0.021
F test				
Prob(F-Statistic)	0.000***			

Note: Table 3 presents the results for regression of Model (3), the estimation results using full sample data. Column I show the results using the COVID-19 dummy based on U.S COVID-19 data, from 21 January 2020 to 30 November 2020. Column II shows the results using the COVID-19 dummy based on Indonesian data, from 02 March 2020 to 30 November 2020 *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Regarding the inflation, higher inflation indicates a growing economy in the short term (Ngoc, 2020; Sumon & Miyan, 2017). When the economy experiences growth, the demand for the exchange rate will also increase. Furthermore, the inflation that is higher than the expectation will also cause the demand for the IDR to increase. This, in turn, appreciate the IDR exchange rate. Regarding the interest rate this research suggests that a higher interest rate tend to depreciate the IDR exchange rate. The higher interest rate will encourage an increase in loan interest rate, and reduce household consumption. Any decline in household consumption will weaken economic growth (Hayat *et al*., 2021). Thus, when the interest rate is higher than market players' expectations, this will be a negative signal for the market. As a result, this will decrease the demand for the IDR. This is supported by research conducted by Anderson *et al*. (2003) finding that the shock component of the US interest rate caused

the dollar to depreciate against the Swiss franc (CHF) and the Deutsche mark (DEM).

In addition, the COVID-19 dummy has a positive and significant effect on USD/IDR. This shows that the COVID-19 pandemic caused the IDR to depreciate against the US dollar. The positive coefficient of COVID-19 dummy shows that the COVID-19 pandemic has caused the depreciation of the IDR to be greater than the depreciation of the dollar exchange rate.

Sign Effect of Macroeconomic Indicator on Exchange Rates

This research also examines the sign effect of the macroeconomic announcement on the changes of exchange rate. The goal is to compare the effect of a negative macroeconomic announcement with a positive macroeconomic announcement on the exchange rate. In this study, positive and negative news are based on the shock of macroeconomic announcements that have a positive or negative impact on the dollar. Thus, the positive news in Indonesia are the Indonesia's shock components causing the IDR exchange rate to weaken. In other words, positive Indonesian and negative US news shows a negative shock component for each country currency.

Table 4
Estimation result of model 4

	I		**II**	
Variable	**Indonesia**		**Indonesia**	
	Coefficient	**Standard error**	**Coefficient**	**Standard error**
Positive News	0.014**	0.006	0.014**	0.006
Negative News	-0.001	0.006	-0.001	0.006
	United States of America		**United States of America**	
	Coefficient	**Standard error**	**Coefficient**	**Standard error**
Positive News	0.000	0.002	0.000	0.002
Negative News	-0.004*	0.002	-0.004*	0.002
Dummy				
COVID-19	0.090***	0.039	0.098***	0.037
F test				
Prob(F-Statistic)	0.000***			

Note: Table 4 presents the results for regression of Model (4), the estimation results using full sample data. Column I show the results using the COVID-19 dummy based on U.S COVID-19 data, from 21 January 2020 to 30 November 2020. Column II shows the results using the COVID-19 dummy based on Indonesian data, from 02 March 2020 to 30 November 2020 *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Model 4 is used to estimate how positive news and negative news from the United States and Indonesia affect the exchange rate before and during the COVID-19 pandemic. Table 4 documents the estimation results from model 4. The table shows that positive Indonesian news and US negative news had a significant effect on the USD/IDR exchange rate. This finding suggests that the market is becoming more focused on negative announcements than positive announcements for each country. This is because during the COVID-19 pandemic, economic conditions deteriorated, and economic growth was negative, causing the pessimistic market, and generating negative sentiment (Zhang *et al*., 2021). These conditions will make the market more

focused on the negative shock component than the positive shock component for each country. The result is different from the research conducted by Fatum *et al*. (2012) suggesting that both positive and negative Japanese macroeconomic news have a significant effect on exchange rates, and negative US macro news have a larger impact than positive US macroeconomic news. However, our results are supported by Ehrmann & Fratzscher (2005); Galati & Ho (2001); Laakkonen (2007) finding that US negative news had a significant effect on exchange rates.

CONCLUSION, LIMITATIONS, AND SUGGESTIONS

This study is conducted to provide empirical evidence on how the impact of shock caused by macroeconomic announcements on the USD/IDR exchange rate before and during the COVID-19 pandemic, and to find out the difference in the impact of positive and negative macroeconomic news on the USD/IDR exchange rate before and during the COVID-19 pandemic. This research suggests several important findings. First, before the COVID-19 pandemic, there is only one out of six macroeconomic announcements in Indonesia that had an effect on the exchange rates, that is the inflation shock component. Meanwhile, none of the indicators for the US macroeconomic announcement has a significant effect on the exchange rate. Second, during the COVID-19 pandemic, the USD/IDR exchange rate becomes more responsive to the shock of macroeconomics. This can be seen by the increasing significance of macroeconomic announcements. This implies that during the COVID-19 pandemic, the government and monetary authorities should be more careful in maintaining exchange rate stability. In determining a policy and maintaining exchange rate stability, the government and monetary authorities must pay attention to market sentiment on existing macroeconomic indicators. And third, the results of this study found evidence that the USD/IDR exchange rate is more responsive to positive Indonesian announcements than those that are negative. On the other hand, the USD/IDR exchange rate is more responsive to negative U.S announcements than those that are positive. Based on this finding, to maintain exchange rate stability, the government and monetary authorities should pay attention to the right time in issuing policies by taking into account market sentiment at that time.

This study uses 16 macroeconomic announcement indicators from the United States and 6 indicators from Indonesia. To examine how the effect of the surprise component macroeconomic announcement on changes in the exchange rate, actual data and market forecast data from the macroeconomic indicators are used. For Indonesia's macroeconomic indicators, researchers only found 6 indicators that have market forecast data. For further research, the more Indonesian macroeconomic indicators used should be added if the data are available. In addition, this study uses ordinary least square (OLS) with Newey-West estimator or OLS HAC. With the existing limitations (discussed in the data and research methods), the most adequate

method is OLS HAC. Although the research purpose is achieved by using this method, the future research should adjust the research model specification to examine how macroeconomic announcements forecast exchange rate volatility.

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