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Money Demand in Indonesia: Does Economic Uncertainty Matter?

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Abstract: Since the global financial crisis of 2008, there has been a rise in economic uncertainty and money demand research. The money demand is vital in monetary policy, which has implications for the regional economy. This study aims to analyse the money demand in Indonesia in the middle of global economic uncertainty, as well as the contribution of the study, which includes the economic and monetary policy uncertainty in a separate model for an enhanced money demand function. The study used a structural vector autoregressive (SVAR) approach. The results indicate that monetary demand is negatively affected by economic uncertainty. With the development of the financial sector, the impact of economic uncertainty and the unpredictability of US monetary policy drives people to be more cautious, resulting in a movement of "wealth" to other instruments. The current study implies that the monetary policy in the form of interest rates as the response to the global condition should consider monetary aggregates in terms of money demand as a precautionary measure to maintain money demand. The study revealed that stable money demand suggests inflation targeting as a monetary policy that can enhance monetary policy in the face of rising economic uncertainty.
Keywords: Economic Uncertainty; Money Demand; Monetary Policy; SVAR
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Introduction

The classical monetary theory suggests that price determination and a stable money demand function play a key role in establishing a long-run equilibrium relation among money, output prices, interest rates, and exchange rates. Contrary to modern Keynesian models of monetary policy, the role of monetary aggregates in relation to the level of output, prices, and interest rates can be determined without knowledge of the money supply. Favara and Giodani (2009) have proven that monetary aggregates have a substantial and persistent effect on output, prices, and interest rates. Bahmani-Oskooee et al. (2015) argue that the rising economic uncertainty affects the public's decision to allocate their wealth among different assets. The literature on the impact of economic and monetary uncertainty on demand for money is poor, particularly in Indonesia. Friedman (1959) suggested that a stable money demand function would have a high degree of statistical precision in predicting the level of money deman. An augmented money demand model that incorporates some additional variables such as economic uncertainty. Economic uncertainty

represents an uncertain economic environment in which the public decides to hold less or more money based on risk aversion (Bahmani-Oskooee & Baek, 2016).

There has been a long debate regarding the role of money demand in the monetary policy framework. Poole (1970) stated that the monetary authority can utilise money demand as a formula by applying monetary aggregates as a policy tool. In contrast, Friedman (1976) argued that monetary aggregates do not play a direct role in policymaking. Thus, emphasised the main target of monetary policy, namely actual output. The development of the literature indicates that one of the targets of monetary policy is the level of price stability. Thus, the inflation-targeting policy can be applied to money targeting or monetary aggregates. According to Duca and VanHoose (2004), the emergence of financial innovation would have an impact on the implementation of monetary policy. It implies that studies on money demand is essential to provide policy alternatives to the monetary authorities.

The economic environment plays an essential role in the fluctuating patterns of money demand (Narayan, 2007; Favara & Giodani, 2009; Bahmani-Oskooee et al., 2015; Widodo, 2015). Economic uncertainty will increase output volatility, affecting people's decisions to allocate their wealth (Bahmani-Oskooee & Baek, 2016; Choi & Oh, 2003; Hossain & Arwatchanakarn, 2020). This study emphasises the economic uncertainty, which reflects people's behaviour about money holdings. If people anticipate high inflation rates due to conditions of economic uncertainty, they will hold more assets than cash. Furthermore, they will hold more money if people anticipate output and currency instability due to uncertain employment opportunities.

Is the pattern of money demand in Indonesia stable? There are different views regarding the stability of Indonesia's money demand. The implication is related to the policies that the monetary authorities can take as a monetary policy strategy. Research by James (2005) analysed the demand for money in Indonesia between 1983 and 2000 using a time trend as a proxy for financial liberalisation. The result demonstrates cointegration among money demand, income, and interest rates. The study employed the CUSUM, and CUSUMQ approaches. The study revealed that the money demand model in Indonesia is stable. The study by James (2005) supports the idea that monetary policy should be aimed at monetary aggregates. Another research by Kurniawan (2020) analysed money demand in Indonesia using the CUSUM and CUSUMQ approaches on the autoregressive distributed lag model (ARDL) by utilising quarterly data from 2000 to 2019. The research showed that the money demand model in Indonesia is unstable. It implied that Kurniawan (2020) supports inflation targeting as a monetary policy in Indonesia. According to the results of the above-mentioned studies, there are differing perspectives on whether monetary policy should employ money targeting or inflation targeting. Using the Indonesian economic uncertainty variable, it is possible to conduct research on money demand. Small number of studies have examined the reaction of money demand to the variable of economic uncertainty, as well as the elasticity of money demand in relation to crisis shocks and economic uncertainty in the model. Narayan (2007) developed a different technique by employing the Johansen Cointegration approach. This cointegration analysis indicates that the model exhibits long-run cointegration between
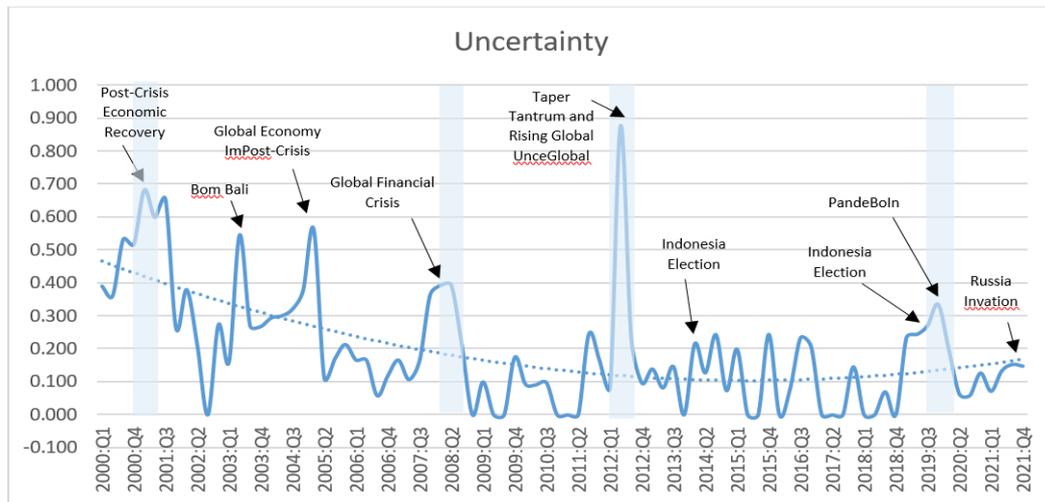
the money demand and its determinants in Indonesia. Meanwhile, the stability test utilising the Hansen Test methodology revealed that the Indonesian money demand model is unstable. The results imply that Narayan (2007) supports inflation targeting as a monetary policy by Bank Indonesia. Therefore, Alamsyah et al. (2001) argued that the monetary authority's inflation-targeting strategy would have a direct impact on aggregate demand, which is consistent with preserving the supply side and sustainable economic growth. Thus, implementing inflation targeting is a logical monetary policy and is accepted by a broad audience.

Ball (2012) stated that the money target policy can be applied if the money demand is stable. The stability of money demand is explained by velocity from M1 with GDP, where stable M1 growth will produce stable GDP growth. Currently, money demand growth moves towards uncertain fluctuations, leading to money demand instability. In that way, the money-targeting policy is "difficult" to apply. The development of innovation in the financial sector creates the velocity of money to fluctuate more. Furthermore, the challenges to the money demand become heavier with the uncertain condition of the economy. According to classical monetary theory, a stable money demand function has a long-run causal effect on the link between money growth and inflation.

The global financial crisis has intensified economist's attention on economic uncertainty (Baker et al., 2016). Coupled with a trade war and pandemic, uncertainty in the future must be anticipated. Pástor and Veronesi (2013) contend that economic uncertainty causes a condition in which future trends and the direction of economic policy cannot be predicted with certainty. The current condition of economic uncertainty gradually has an adverse impact on economic growth or macroeconomic variables, including the demand for money. Different authors conducted the impact of economic uncertainty to money demand, such as Choi and Oh (2003); Bahmani-Oskooee et al. (2015); Bahmani-Oskooee and Baek (2016); Bahmani-Oskooee and Nayeri (2017); Hossain and Arwatchanakarn (2020) a common conclusion that the rising uncertainty effect to money demand and alters its stability, which can change the view of monetary policy.

In Indonesia, the economic instability that arose during the 1998 crisis resurfaced with the global financial crisis of 2008 and has garnered attention ever since. Setiastuti (2017) analyses the effect of global uncertainty on macroeconomic conditions in Indonesia by using the time-varying Bayesian structural VAR (TVP-BVAR). The results showed that global uncertainty shocks cause declines in prices, interest rates, and the trade balance that have an effect on output. The shock of global uncertainty can harm economic conditions in Indonesia. Aswicahyono and Hill (2014) analyse five countries, namely Brazil, India, Indonesia, South Africa, and Turkey, and conclude that these five countries face a twofold capital shock and a decline in trade. Capital outflows in Indonesia occurred after a shock, causing the Indonesia Stock Exchange (IDX) to decline, and triggering exchange rate depreciation. Research by Choi and Oh (2003) analysed the demand for M1 money in the US. The research argued that during specific episodes, it was mainly due to a misspecification of the money demand function compared to economic behaviour. However, other events showed that output uncertainty negatively affected money demand. Moreover, the uncertainty of the monetary sector has a positive effect. Abid

(2020) stated that economic uncertainty impacts decreasing levels of investment and consumption and increases financial costs.

Figure 1 Uncertainty Era in Indonesia
Source: Data by Baker et al. (2016) and own study

Bahmani-Oskooee and Satawatananon (2015) determined economic uncertainty with volatility in real GDP and monetary uncertainty with nominal monetary volatility, such as M2. The research tested the hypothesis of output and monetary uncertainty on money demand in Thailand by employing a bound test approach. The result showed that both uncertainties affect short- and long-term money demand. Both uncertainties (economic and monetary) have a negative effect on money demand in Thailand in the short term, in contrast to the long term, where monetary uncertainty has a negative effect. However, economic uncertainty positively affects the long-term demand for money. The impact of economic uncertainty causes the public to be more careful so that the public will hold more cash. In contrast, monetary uncertainty causes a substitution effect from cash into assets. Moreover, Bahmani-Oskooee and Baek (2016) identified Korea's economic and monetary uncertainty. The ARDL approach shows that both uncertainties affect the short run, while only economic uncertainty affects the demand for money in the long term. Economic uncertainty causes Koreans to save less cash and replace it with assets.

Using the ARDL approach, Bahmani-Oskooee and Nayeri (2018) analysed the impact of policy uncertainty on the Australian money demand. Policy uncertainty has an effect in the short term but not in the long term. There is a significant asymmetric effect in the long run when a decrease in policy uncertainty will reduce the cash demand in Australia. Aweda et al. (2014) analysed the demand for money in the UK using the VECM approach. The study revealed that money demand is elastic to the production index in the long run and is inelastic to short-term interest rates and exchange rates. The global financial crisis had a negative effect on money demand in the UK.

There have been many studies on money demand in Indonesia. In previous research, only standard variables were utilised to discuss the factors affecting money demand. However, few studies discuss the economic uncertainty of the money demand, especially in Indonesia. The novelty of the study conducted augmented money demand by using economic uncertainty through utilising Global Economic Policy Uncertainty as a variable of economic uncertainty built by Baker et al. (2016) and US monetary policy uncertainty from Husted et al. (2017). The purpose of this study is to analyse the money demand in the global economic uncertainty that exists in Indonesia. This study also examines the transmission and effects of shocks on macroeconomic variables on money demand.

Research Method

This study examines quarterly data in the form of time-series data from 2000Q1 to 2021Q4. The data generated from several research sources, such as Indonesian Economic and Financial Statistics, Bank Indonesia (SEKI-BI), the Central Statistics Agency (BPS), and Global Economic Policy Uncertainty as a variable of economic uncertainty developed by Baker et al. (2016) and Davis (2016). Additionally, this study examines the money demand in a narrow sense (M1) and a broad sense (M2), utilising two variables on money demand to determine in detail the characteristics of money demand in Indonesia. This study utilises income variables to obtain an idea related to the pattern of income to the demand for money in Indonesia with an increase in income will increase the acceleration of transactions by itself will increase the money demand (Narayan, 2007). CPI has an inverse relationship with income to money demand (Prawoto, 2016). The higher the CPI level, the public will prefer to hold more assets than cash. The interest rate variable is a surrogate for the opportunity to hold money conducted based on Narayan's analysis (Narayan, 2007).

Table 1 Definition of Variables

Proxy Variables	Description	Symbol	Source
Money Demand for Broad Money	Money demand at the broad definition	*BM*	Bank Indonesia
Real Income	As a transaction in demand for money using the variable GDP	*Inc*	Bank Indonesia
Inflation	Utilising quarterly data	*Inf*	Bank Indonesia
Interest rate	A proxy from an opportunity to hold money	*r*	Bank Indonesia
Exchange rate	Nominal exchange rate of rupiah against the US dollar	*Exc*	Bank Indonesia
Economic Uncertainty	Economic uncertainty	*EU*	Baker et al. (2016)
Monetary Policy Uncertainty	The US monetary economic policy uncertainty	*MPU*	Husted et al. (2017)

There is an a priori link between exchange rates and money demand. A rise in the real exchange rate, which implies a depreciation of the domestic currency, will boost the value of foreign assets denominated in the domestic currency (Narayan, 2007). As this is regarded a gain in wealth, depreciation should have a favourable impact on the money

demand. However, a devaluation can spark speculation that the demand for domestic currency will decrease because the public prefers to hold foreign money. Consequently, depreciation will reduce the need for money, which means that depreciation will have a negative effect on the demand for money (Narayan, 2007). Using economic uncertainty and policy variables, the author utilises the calculations proposed by Baker et al. (2016) and Davis (2016) to see their effect on the demand for money in Indonesia. The details of the data are available in Table 1.

This study focuses on the *interrelationship* between macroeconomic variables such as GDP as a proxy for income, inflation, interest rates, exchange rates, economic uncertainty, and money demand with a *structural vector autoregressive* (SVAR) approach. This method examines the transmission and effects of shocks on macroeconomic variables on money demand. According to Bacchiocchi and Fanelli (2015), the SVAR method is used for policy analysis and the response of a variable to shocks, because it is recognised that structural shocks must be identified for the simulation of a policy. Magnusson and Mavroeidis (2014) revealed that structural shifts in macroeconomics might be constructively utilised to identify structural relationships that are *invariant*s through time.

This study focuses on the demand for money and its environment, such as a country's macroeconomic conditions. Given the importance of money demand as a transaction tool, macroeconomic variables, economic uncertainty, and shocks will impact the overall demand for money because it can affect people's purchasing power. The contribution of this research is to provide an overview of the importance of monetary policy with a quantitative approach (money demand) and the response to money demand based on macroeconomic variables and their shocks. The SVAR approach is employed for policy analysis. The SVAR *model was developed based on the theoretical basis and previous research. Impulse response* analysis and *forecast error variance decomposition* are applied to describe the empirical findings in the study. According to Arwatchanakarn (2017), the SVAR model is more exciting and profitable than the VAR model because it may employ multiple economic theories and previous research to predict the response of a variable when other variables experience shocks. The formula is as follows:

$$BM = f(Inc, Inf, r, Exc, Eu, Mpu)$$

Where BM is money demand function, Inc as income proxy for the GDP, Inf as inflation, r as domestic interest rate, Exc as the exchange rate rupiah to dollar, Eu as economic uncertainty conducted by Baker et al. (2016) and Mpu as the uncertainty of US monetary policy conduct by Husted et al. (2017). Assuming that $X_{1,t}$ is a vector of η_1, which is the money demand variable, and $X_{2,t}$ vector of η_2 is the macroeconomic variable and economic uncertainty (GDP as a proxy of Income, Inflation, interest rate, exchange rate, economic and US monetary policy uncertainity) at time t. We assume that X1, t is an exogenous variable to macroeconomic variables, both dynamic relationships and structural shocks in the vector that can affect the value of $X_{1,t+k}$ for every k > 0. The equation of the SVAR, as proposed by Carrillo et al. (2020), is written as follows:

$$A^{-1}X_t = C + \sum_{\ell=1}^{p} B_\ell X_{t-\ell} + v_t \qquad\qquad (1)$$

Where C is n x 1, which is a constant vector.. A^{-1} is n x n which is used as a matrix of contemporary structural relationships between variables in the model, B_ℓ is a persistent matrix, and v_t is a vector of structural innovations with an average equal to zero, not containing autocorrelation and the same variance-covariance matrix. With E$\{v_t, v_t\}$=I_n.. The model with the derivative will produce a version of the multiplication on system A, which becomes:

$$X_t = \tilde{C} + \sum_{\ell=1}^{p} \tilde{B}_\ell X_{t-\ell} + \xi_t \qquad (2)$$

Where $\tilde{C} \equiv AC$, $\tilde{B} \equiv AB$ dan $\xi_t \equiv Av_t$, which are vector forms derived from the innovation form with the same variance-covariance matrix for E$\{\xi_t, \xi_t\}$=Ω. Therefore, matrix A follows $AA' = \Omega$.

To fulfill the exogenous block, the matrix A and $\tilde{B}_\ell$ are matrices with blocks equal to zero, so they can be written as follows:

$$A \equiv \begin{bmatrix} A_{zz} & 0 \\ A_{zy} & A_{yy} \end{bmatrix} \text{ and } \tilde{B}_\ell \equiv \begin{bmatrix} \tilde{B}_{zz,\ell} & 0 \\ \tilde{B}_{zy,\ell} & \tilde{B}_{yy,\ell} \end{bmatrix} \qquad (3)$$

Where A_{zz} represents the impact of shocks from variables on the system, A_{zy} indicates the effects of macroeconomic variables, and A_{yy} represents the impact of shocks on macroeconomic variables and economic uncertainty. Likewise, $\tilde{B}_{zz,\ell}$ is the effect of the *lagged* ℓ variable on the variable when it occurs, $\tilde{B}_{zy,\ell}$ is the effect of the current macroeconomic variable, and $\tilde{B}_{yy,\ell}$ is the effect of the lagged ℓ macroeconomic variable and the current macroeconomic variable.

Result and Discussion

All variables have mean values that are superior to their standard deviations, indicating that all variables have high variability. The skewness value in the data indicates the slope of the data. The data's skewness value reveals the slope of the data. If the skewness value is positive, it indicates that the data has a slpe to the right, and if it is negative, it shows that the data has a slope to the left. Table 2 shows only broad money (BM) and income (Inc) variables with a negative skewness value. Both variables are skewed to the left, whilst the remaining variables have a positive skewness value.

Table 2 Descriptive Analysis

	BM	Inc	Inf	r	Exc	Eu	Mpu
Mean	14.828	14.440	5.797	6.959	9.306	0.163	4.704
Maximum	15.804	14.852	17.110	12.750	9.703	0.877	5.853
Minimum	13.685	13.942	1.330	3.500	9.022	0.000	3.854
Std Dev	0.663	0.285	3.351	2.103	0.203	0.153	0.414
Skewness	-0.248	-0.173	1.398	0.730	0.273	1.790	0.210
Kurtosis	1.722	1.713	5.171	3.653	1.444	8.354	2.956
Obs	75	75	75	75	75	75	75

The kurtosis value is utilised to identify whether the data is normally distributed or not. The data are typically distributed if the kurtosis value is at number 3 or around number 3. Furthermore, if the value is above three, the data distribution is at a high peak. Then, if the kurtosis is below three, it means that the data distribution is flat. The variables with a kurtosis value of more than three are inflation, interest rate, and exchange rate. It means that the data distribution is at a high peak. The other variables with a kurtosis value below 3 mean that the data distribution is flat. All variables have the same observation value, as many as 75.

This study applies the unit root test Phillips-Perron (PP) approach to test the presence of non-stationary stochastic in time-series data. The use of PP is also to eliminate the problem of heteroscedasticity in the data. The unit root test applies "trend and intercept" as a unit root test with "trend" and applies "intercept" as a unit root test with "no trend". Broad Money (BM), real income (Inc), Inflation (Inf), interest rate (r), exchange rate (Exc), Uncertainty Index (Eu), and monetary policy uncertainty (MPU) index are stationary at the first difference I(1) based on the unit root test results of the PP approach. Only inflation (Inf), uncertainty index (Eu), and monetary policy uncertainty (Mpu) variables are stationary in the first difference. The unit root test does not apply second difference I(2) because it can produce false regressions.

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Table 3 Unit Root Test

Variables	Philips-Perron	
	Intercept	Trend & Intercept
	Level	
BM	6.137	0.813
Inc	1.198	-3.081
Inf	-2.636*	-3.679**
r	-1.490	-3.020
Exc	-1.270	-2.417
Eu	-5.450***	-6.476***
Mpu	-4.351	-4.680***
	First Difference	
BM	-9.902***	-13.168***
Inc	-11.935***	-13.610***
Inf	-7.988***	-7.941***
r	-4.618***	-4.519***
Exc	-11.713***	-11.661***
Eu	-17.114***	-17.067***
Mpu	-18.281***	-18.300***

Note: The ***, **, and * indicate the statistically significant level at 1%, 5%, and 10%, respectively.

Money demand response to shocks

Contrary to prior study by Narayan (2007) and Kurniawan (2020) in Indonesia, income positively has a beneficial effect on money demand. There are varying approaches to analysing the effect of income on money deman, which account for the disparity. The findings show the inconsistency of economies of scale in holding money. However, this does not happen by accident. Along with the development of financial innovation, the community is presented with numerous options for storing wealth other than in the form of money, such as assets and shares that can be utilised by the public as an alternative portfolio storage option. This finding is in line with Baharumshah et al. (2009). This is not much different and is in line with expectations when there is a shock to exchange rate volatility. Shocks or an increase in the exchange rate will reduce the demand for money, which means that if the rupiah depreciates, the demand for holding money will decrease, and this is in line with research by Narayan (2007), the depreciation of the domestic currency will have a more significant impact on the demand for foreign currency than holding the domestic currency.

A negative response to the money demand occurs when there is a shock to the inflation variable. The increase in the price of commodities causes people to reduce their consumption and invest their wealth in other assets or portfolios. Boonekamp (1978) suggest that using inflation as a variable and its relationship to money demand is prone to inaccurate forecasts because it can increase uncertainty about future prices. As uncertainty about future prices increases, it will affect the money demand. In addition to influencing the money demand, it will also increase prudence, thereby increasing the demand for portfolios or other assets. A positive response is shown in demand for money when there is a shock to the domestic interest rate. This is inversely proportional to the theory that interest rate policy aims to reduce the level of money demand. This finding is in line with research by Favara and Giordani (2009), which shows that monetary aggregate responds positively to the federal fund rate for a prolonged period. This reflects the endogenous response of a policy known as the Taylor rule that can increase inflation and output after a shock to the monetary aggregate.
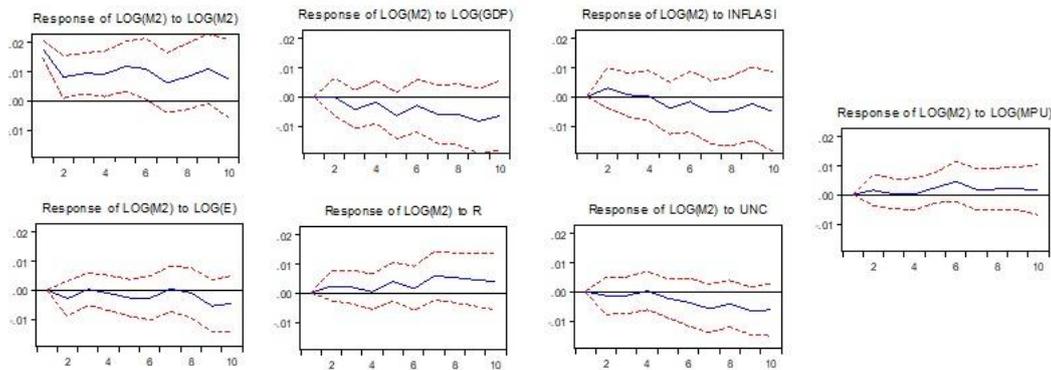
Uncertainty as a shock effect

The attention of researchers is currently increasing on conditions of economic uncertainty. Economic uncertainty can reflect people's propensity to hoard money. Uncertainty in the study consists of two indices: economic uncertainty, an index developed by Baker et al. (2016), and the US monetary uncertainty policy index developed by Husted et al. (2017). The use of the US monetary uncertainty policy cannot be separated from the fact that several monetary policies in Indonesia are closely related to US policy. Thus, the utilisation of US MPU is an anticipatory measure of global monetary uncertainty.

The results of the IRF when Eu and Mpu as a shock effect indicate that money demand responds negatively to Eu and positively to Mpu. The impact of economic uncertainty causes people to be more careful so that people will shift their "wealth" to other

instruments besides money, such as assets, etc. Meanwhile, monetary uncertainty has led to increased demand for money. The negative response to Eu turmoil is in line with research by Bahmani-Oskooee and Satawatananon (2015), Bahmani-Oskooee and Baek (2016), and Aweda et al. (2014).

The response of variable income, interest rates, and exchange rates tend to move negatively when there is a shock from Eu and Mpu. When the domestic exchange rate depreciates, it can increase demand for foreign exchange rates that are "more resistant" to shocks from economic uncertainty than the domestic currency. This condition can trigger a movement in the depreciation of the domestic exchange rate towards the worse. The results align with Narayan's (2007) related exchange rate depreciation. The response of the inflation variable related to the Eu and Mpu shocks shows a fluctuating response, where prices will increase. When the Eu and Mpu shock gradually get longer, people are "forced" to accept the new price (price increase).

Figure 2 Impulse response function (with 95% error bands). The impulse responses are computed using lag 6 for VAR models.

Other findings

The IRF method shows more comprehensive results, such as subdued inflation fluctuations with an upward trend in interest rates. In the last two years, the pandemic has caused a crisis that has kept the increase in interest rates at a prudent level. Likewise, income is responded to in a negative direction by interest rates. Income fluctuation can cause people's purchasing power to fall, which is responded to by lowering interest rates to maintain people's purchasing power. This demonstrates that monetary policy, through the use of interest rates, may normalise and boost the domestic economy. It is more adaptive in its implementation, djusting to domestic economic situations in light of the global economy.

Other results are shown in the negative income response when there is a shock to inflation and exchange rates. It shows that shocks to inflation and exchange rates can reduce people's purchasing power. Maintaining inflation and exchange rate stability can maintain people's purchasing power. Similarly, when there is a shock in the currency rate,

the interest rate will increase. This is intended to enhance the rupiah exchange rate relative to foreign currencies.

Forecast Error of Variance

The Forecast Error of Variance (FEV) presented in the table illustrates the importance of a shock. FEV, apart from money demand, is dominated on average by income with a time horizon of 10th, 25th, and 50th, which is 6,817, 13,536, and 16,259. The difference in the effect of the income variable with a longer time horizon shows a significant increase from 6,817 on the 10th to 13,536 on the 25th. Next is inflation, which strongly influences income, with an average of 3,283 on the 10th, increasing over the 25th time horizon to 6,182 and 6,474 on the 50th time horizon.

Table 4 Forecast Error of Variance

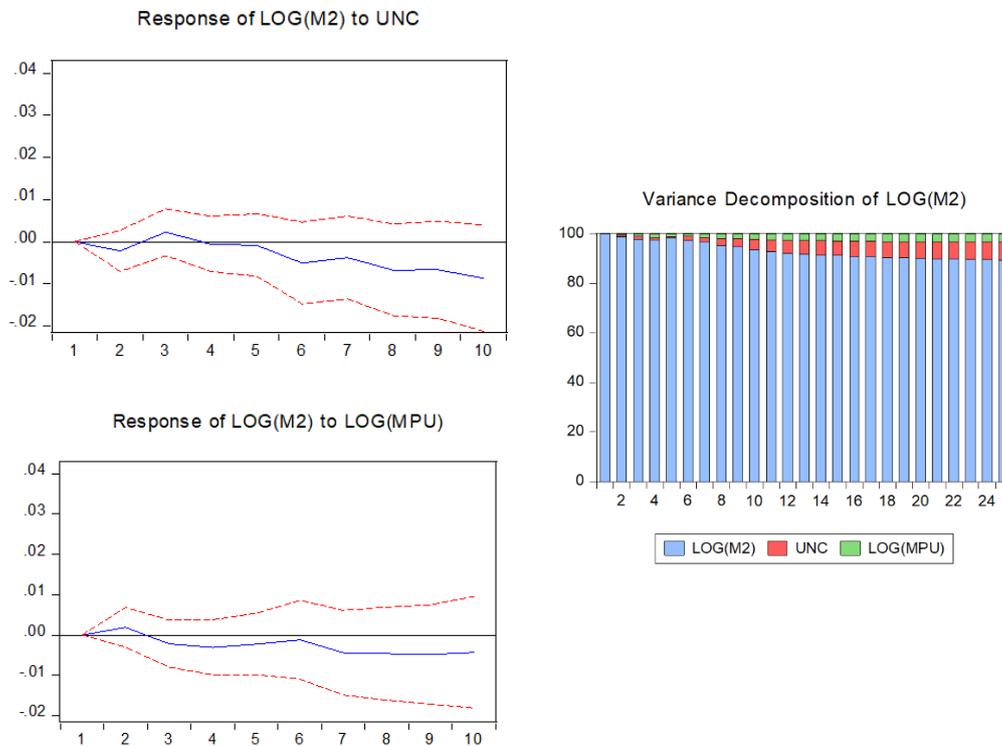|	Dynamic Horizon	BM	Inc	Inf	Exc	r	Eu	Mpu
Average	10th	79.549	6.817	3.283	2.087	3.674	2.972	1.618
Forecast	25th	64.412	13.536	6.182	5.350	3.552	5.604	1.364
	50th	61.092	16.259	6.474	6.577	2.651	5.957	0.989

Variable shock increases when a longer time horizon is utilised. However, there are several decreasing variables domination. For example, the interest rates on the 25th horizon, which is 3,552, decline to 2,651 on the 50th time horizon. The uncertainty of the US monetary economic policy shows a decrease in its dominance in the model from 1,618 on the ten-time horizon to 1.364 and 0.989. The difference in economic uncertainty has increased in dominance from 2,972 to 5,604 on the 25th and 5,957 on the 50th time horizon.

Demand for money and the uncertainty

This section presents a model with three variables in structural shocks. Each variable is a representation of a moving average vector. The equation in the model is $\Delta z_t = C(L)u_t$ where it is the endogenous vector Δz_t variable, CL is the matrix of the polynomial lag and u_t is the vector of the identified structural shocks. The three variables formed in the model are money demand (BM), economic uncertainty (Eu), and US monetary policy uncertainty (Mpu). This section aims to identify further the structural shocks of the effect of economic uncertainty (Eu and Mpu) on money demand in Indonesia.

The fundamental difference from the previous model is in the model with three variables using a lag order of 5. The results showed that there was no difference in the previous model and supported the results of research by Bahmani-Oskooee and Satawatananon (2015), Bahmani-Oskooee and Baek (2016), and Aweda et al. (2014). In times of economic instability and monetary policy uncertainty in the United States, the demand for money demonstrated a negative response. With the growth of the financial sector, the effects of economic uncertainty and the unpredictability of US monetary policy cause people to be more cautious, resulting in a shift of "wealth" from money to other instruments, such as assets, etc. There is a substitution effect that occurs when there is a shock or increase in economic uncertainty (Eu and Mpu) from the role of holding money to other financial

instruments such as assets, shares, etc. Figure 3 shows that economic uncertainty (Eu) is more dominant than US monetary policy uncertainty (Mpu) based on FEV results.

Figure 3 Impulse response function (with 95% error bands). The impulse responses are computed using lag 5 for VAR models and forecast error of variance.

Conclusion

This study aims to analyse money demand under economic uncertainty in Indonesia. This study focuses on the relationship between macroeconomic variables such as GDP as a proxy of income, inflation, interest rates, exchange rates, economic uncertainty, and money demand by employing the structural vector autoregressive (SVAR) approach. This method is used to examine the transmission and the effect of macroeconomics variable shock of money demand. This study utilises quarterly data from time-series data from 2000Q1 to 2021Q4.

The results revealed the sensitivity of money demand to income changes, prices, and exchange rate volatility. The positive reaction to changes in interest rates indicates that the structure of money demand in Indonesia closely resembles the Taylor rule policy. The Taylor rule can increase inflation and output after a shock to the monetary aggregate or money demand. The negative response showed by the money demand when there is economic uncertainty and uncertainty in the US monetary policy. Due to economic and US Monetary policy instability, the expansion of the financial sector altered the behaviour

of individuals, who became more concerned about diversifying their holdings. This study implies that the monetary policy in the form of interest rate as the response to the global condition should consider the monetary aggregates in terms of money demand as an anticipatory step in maintaining money demand. A major implication of our findings revealed that stable money demand suggests the inflation targeting as monetary policy that can strengthen the monetary policy amid increasing economic uncertainty. This study using the uncertainty variables conduct by Baker et al (2016) specifically uncertainty variables for Indonesia. Future research can develop augmented money demand function using for the global uncertainty or policy uncertainty conducted by economic uncertainty policy group in order to generate the money demand function from a different perspective.

References

Abid, A. (2020). Economic policy uncertainty and exchange rates in emerging markets: Short and long runs evidence. *Finance Research Letters, 37*, 101378. https://doi.org/10.1016/j.frl.2019.101378

Alamsyah, H., Joseph, C., Agung, J., & Zulverdy, D. (2001). Towards Implementation of Inflation Targeting in Indonesia. *Bulletin of Indonesian Economic Studies, 37*(3), 309–324. https://doi.org/10.1080/00074910152669154

Arwatchanakarn, P. (2017). Structural vector autoregressive analysis of monetary policy in Thailand. *Sociology Study, 7*(3), 133-145. https://doi.org/10.17265/2159-5526/2017.03.002

Aswicahyono, H., & Hill, H. (2014). Survey of Recent Developments. *Bulletin of Indonesian Economic Studies, 50*(3), 319–346. https://doi.org/10.1080/00074918.2014.980374

Aweda, N. O., Akinsanya, T., Akingbade, A., & Are, S. O. (2014). Empirical analysis of the elasticity of real money demand to macroeconomic variables in the United Kingdom with 2008 financial crisis effects. *Journal of Economics and International Finance, 6*(8), 190–202. https://doi.org/10.5897/jeif2014.0581

Bacchiocchi, E., & Fanelli, L. (2015). Identification in Structural Vector Autoregressive Models with Structural Changes, with an Application to US Monetary Policy. *Oxford Bulletin of Economics and Statistics, 77*(6), 761–779. https://doi.org/10.1111/obes.12092

Bahmani-Oskooee, M., & Baek, J. (2016). Economic uncertainty, monetary uncertainty and the Korean demand for money. *Journal of Economic Policy Reform, 20*(1), 86–97. https://doi.org/10.1080/17487870.2016.1213166

Bahmani-Oskooee, M., & Nayeri, M. M. (2018). Policy Uncertainty and the Demand for Money in Australia: an Asymmetry Analysis. *Australian Economic Papers, 57*(4), 456–469. https://doi.org/10.1111/1467-8454.12127

Bahmani-Oskooee, M., Satawatananon, K., & Xi, D (2015). Economic uncertainty, monetary uncertainty, and the demand for money in Thailand. *Global Business and Economics Review, 17*(4), 467-476.

Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring Economic Policy Uncertainty*. *The Quarterly Journal of Economics, 131*(4), 1593–1636. https://doi.org/10.1093/qje/qjw024

Ball, L. (2012). Short-run money demand. *Journal of Monetary Economics, 59*(7), 622–633. https://doi.org/10.1016/j.jmoneco.2012.09.004

Boonekamp, C. F. J. (1978). Inflation, Hedging, and the Demand for Money. *The American Economic Review, 68*(5), 821–833. Retrieved from http://www.jstor.org/stable/1811315

Carrillo, J. A., Elizondo, R., & Hernández-Román, L. G. (2020). Inquiry on the transmission of U.S. aggregate shocks to Mexico: A SVAR approach. *Journal of International Money and Finance, 104*, 102148. https://doi.org/10.1016/j.jimonfin.2020.102148

Choi, W. G., & Oh, S. (2003). A Money Demand Function with Output Uncertainty, Monetary Uncertainty, and Financial Innovations. *Journal of Money, Credit, and Banking, 35*(5), 685–709. https://doi.org/10.1353/mcb.2003.0034

Davis, S. (2016). An Index of Global Economic Policy Uncertainty. https://doi.org/10.3386/w22740

Duca, J. V., & VanHoose, D. D. (2004). Recent developments in understanding the demand for money. *Journal of Economics and Business, 56*(4), 247–272. https://doi.org/10.1016/j.jeconbus.2004.01.001

Favara, G., & Giordani, P. (2009). Reconsidering the role of money for output, prices and interest rates. *Journal of Monetary Economics, 56*(3), 419–430. https://doi.org/10.1016/j.jmoneco.2009.01.002

Friedman, B. M. (1976). Targets, instruments, and indicators of monetary policy. *Journal of Monetary Economics, 1*(4), 443–473. https://doi.org/10.1016/0304-3932(76)90013-1

Friedman, M. (1959). The Demand for Money: Some Theoretical and Empirical Results. *Journal of Political Economy, 67*(4), 327–351. https://doi.org/10.1086/258194

Hossain, A. A., & Arwatchanakarn, P. (2020). The effect of economic uncertainty on narrow money demand and its stability in New Zealand: An empirical investigation. *Economic Analysis and Policy, 68*, 88–100. https://doi.org/10.1016/j.eap.2020.09.002

Husted, L., Rogers, J., & Sun, B. (2017). Monetary Policy Uncertainty. *International Finance Discussion Paper, 2017*(1215), 1–56. https://doi.org/10.17016/ifdp.2017.1215

James, G. A. (2005). Money demand and financial liberalization in Indonesia. *Journal of Asian Economics, 16*(5), 817–829. https://doi.org/10.1016/j.asieco.2005.08.003

Kurniawan, M. L. A. (2020). The stability of money demand in Indonesia: An ARDL Approach. *Optimum: Jurnal Ekonomi dan Pembangunan, 10*(2), 153-162. http://dx.doi.org/10.12928/optimum.v10i2.18002

Magnusson, L. M., & Mavroeidis, S. (2014). Identification using stability restrictions. *Econometrica, 82*(5), 1799–1851. Retrieved from http://www.jstor.org/stable/24029294

Narayan, P. K. (2007). Is money targeting an option for Bank Indonesia? *Journal of Asian Economics, 18*(5), 726–738. https://doi.org/10.1016/j.asieco.2007.06.002

Pástor, Ľ., & Veronesi, P. (2013). Political uncertainty and risk premia. *Journal of Financial Economics, 110*(3), 520–545. https://doi.org/10.1016/j.jfineco.2013.08.007

Poole, W. (1970). Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model. *The Quarterly Journal of Economics, 84*(2), 197-216. https://doi.org/10.2307/1883009

Prawoto, N. (2016). Permintaan uang di Indonesia tahun 1976-1996 (Konsep keynesian dan monetaris dengan pendekatan PAM). *Economic Journal of Emerging Markets, 5*(1), 37–52. https://doi.org/10.20885/ejem.v5i1.6899

Setiastuti, S. (2017). Time-varying macroeconomic impacts of global economic policy uncertainty to a small open economy: evidence from Indonesia. *Buletin Ekonomi Moneter dan Perbankan, 20*(2), 129-148. https://doi.org/10.21098/bemp.v20i2.809

Widodo, A. (2015). Faktor-faktor makroekonomi yang mempengaruhi permintaan uang di Indonesia. *Jurnal Ekonomi & Studi Pembangunan, 16*(1), 63-72. Retrieved from https://journal.umy.ac.id/index.php/esp/article/view/1222