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Short-Term and Long-Term Estimation of Indonesia's Money Demand Using the ECM Approach

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A B S T R A C T
In this research, Indonesia's money demand in the period 1998:Q1-2024:Q1 will be discussed. This study was conducted to estimate Indonesia's money demandFor this purpose, it will be studied whether there is an effect of structural changes in the sample period on the stability of Indonesia's money demand. This study uses the *Error Correction Model* (ECM) approach, where before deciding to use the model, the nature of data stationarity is first investigated. To explain the phenomenon of structural change, two treatments were made, the first treatment inserting three *dummy* variables into the model (D1=1, D2=1, D3=1), while the second treatment inserting four *dummy* variables into the model by adding D4=1. The two treatments each used three *different dummy estimation techniques, namely intercept dummies*, *slope dummies*, and *slope and intercept dummies*. From the results of the estimation, it is obtained that there is a possible *trade-off* between the equation of money demand with or without *a dummy*, where the demand for money without *a dummy* produces a significant but unstable coefficient, on the other hand, the demand for money with *a dummy* produces a stable model but many insignificant coefficients.

INTRODUCTION

Monetary policy in general aims to achieve development goals such as price stability, economic growth, job creation, and balance of payments. The final goal cannot be achieved directly with existing monetary instruments, but through a policy transmission that involves monetary indicators as intermediate targets, one of which is the money supply.

The money supply is the result of the interaction between the demand and supply of money in the money market. Bank Indonesia (BI) as the monetary authority in Indonesia can influence the supply side of the money market by controlling the core money which will then affect the money supply through the money multiplier effect. Money multiplier is a multiplier effect whose magnitude depends on the reserve ratio and portfolio preferences of the public and the government. Even if the central bank can control the money supply, the demand for money is entirely determined by the behavior of economic agents. Thus, to determine the effectiveness of the policy of changing the money supply carried out on the money market, the central bank must know the characteristics of money demand. Therefore, the stability and predictability of money demand is crucial in making monetary decisions. Monetary decisions are inseparable from the macroeconomic climate. Over the past three decades, Indonesia has experienced several periods of structural change that have changed the fundamentals of the Indonesian economy. These changes can be felt not only in terms of changes in the economic behavior patterns of the community and the business world, but also in the adjustment of economic policies. Since the era of deregulation on June 1, 1983 and then supported by the 1988 Pact, Indonesia has entered the stage of financial liberalization. Since the liberalization, the financial and banking sectors in Indonesia have experienced rapid development, Dekle and Pradhan (1999) noted that one of the indicators of the impact of financial liberalization is that the number of banks in Indonesia has increased rapidly from 111 in 1989 to 240 in 1994. This has led to an increasingly complex Indonesian banking system and an increasingly dynamic monetary sector, which requires increasingly complex monetary planning and control.

In addition to financial liberalization, one of the starting points that brought fundamental changes in the Indonesian economy was the impact of the financial crisis that hit Asian countries in the mid-1990s. The crisis led Indonesia to a monetary and banking crisis which then developed into a multidimensional crisis of 1997-1998. The floating exchange rate system that was later adopted made the exchange rate no longer act as an anchor of the economy so that the monetary policy framework became a base money targeting (BMT). The economic crisis has caused deep trauma, especially in the monetary sector. Alamsyah, et al. (2003) stated that after the crisis, monetary conditions were characterized by banking intermediation functions that were not effective so as to hinder the monetary transmission mechanism, a very dramatic increase in base money, banking in conditions of excess liquidity, very volatile exchange rates, and persistent inflation at the double-digit level. Various monetary policies in the context of recovery measures implemented after the crisis until then the BMT policy framework were no longer relevant so in 2005, BI changed the policy framework to the Inflation Targeting Framework (ITF) which set inflation as the main target of monetary policy.

The development of the monetary system in line with the development of the increasingly dynamic monetary sector has caused a change in the behavior of the demand for money by the public, therefore in order for monetary policy formulation to be carried out accurately and consistently, it is necessary to reassess the specifications of money demand. Studies on the demand for money have been widely conducted in both developed and developing countries. In Indonesia itself, research on the demand for money has grown rapidly since the 1990s, in response to structural changes that occurred due to financial liberalization and the impact of the economic crisis. This will be explained in full in the literature review.

To specify the money demand model, the role of the money supply is ignored, in the sense that the demand and supply of money are assumed to be in equilibrium conditions. In fact, in the short term, the amount of money demanded and offered is liquidated and requires adjustment time to reach the equilibrium level. Thus, the cointegration model is the most appropriate model for estimating the function of money demand. Cointegration is an important condition for the demand for money to be stable in the long term (Melnick, 1995; Ericsson and Sharma, 1996). Various econometric techniques are used to estimate the function of money demand, including the Partial Adjustment Model (PAM) which was popular in the 1970s, the Buffer Stock Model, the Error Correction Model (ECM), and the Vector Error Correction Model (VECM). This study uses ECM econometric techniques in estimating the function of money demand, where Sriram (2018) in his survey on money demand studies stated that ECM has been proven to be one of the most successful methods in applying money demand. In accordance with the above background, the problems studied in this study are: "What is the function of money demand in the period 2008:Q1-2024:Q1?". To answer these problems, it is necessary to examine whether there are effects of changes in economic structure in the long and short term.

LITERATURE REVIEW

Studies on the demand for money have been carried out since the last few decades, both in developed countries and in developing countries with the definition of money in a variety of different definitions. Research on the demand for money continues to develop, especially in its research methods. Sriram in 2011 conducted a survey of empirical studies on the demand for money in several developed and developing countries during the 1990s. Basically, the demand for money is a function of the scale of economic activity (scale variable) and the opportunity cost of holding money. The variable that is generally used to explain economic activity is the national income variable, while to define the opportunity cost of holding money various different variables are chosen according to the macroeconomic situation and the level of openness of the economy of a country.

In a survey conducted by Sriram (2001), a study on the demand for Indonesian money was conducted by Price and Insukindro (1994) and Dekle and

Pradhan (1997). Price and Insukindro (2012) used the error correlation model (ECM) method to estimate the function of money demand

Indonesia, which in this case is measured by two variables, namely currency held by public and demand deposits, using data The results of the study are that the Engle and Granger cointegration test shows no cointegration for currencies, but the Johansen test shows the cointegration for both definitions of monetary aggregate. about the stability of real money demand in four ASEAN countries, including Indonesia, by including the Purchasing Power Parity (PPP) equation using 1974-1995 data. The study linked the demand for real money to financial liberalization, where linear time trends and dummy variables are used to explain financial innovation and institutional change that occur due to financial liberalization. The results of the study show that Indonesia's real money demand function is stable. However, it would not be integrated if linear time trends and dummy variables were not included that explain the existence of financial liberalization. Research conducted by Dekle and Pradhan (2017) shows that the phenomenon of financial liberalization cannot be separated in the study of money demand. This became the basis for subsequent studies to associate the demand for money with the phenomenon of financial liberalization, including James (2005) and Lestano and Jacobs (2006). Both studies used the autoregressive distributed lag (ARDL) approach to estimate Indonesia's money demand. James (2005) found that the function of long-term money demand was stable in the 1983:Q1-2000:Q4 sample. James (2005) also found that financial liberalization has an important role in determining the demand for money and its fluctuations. evaluate the sensitivity of money demand to financial liberalization and include exchange rates in addition to foreign interest rates in the money demand function considering that Indonesia is an open developing country. The study used sampling from 1980:Q1-2004:Q4.to include three dummy variables that reflect economic conditions during the financial liberalization period and the economic crisis. The results of the study show that the demand for M1 is stable but the demand for M2 is not stable, especially in the 1990s. In addition, financial liberalization and economic crises have a crucial role both in short-term money demand movements and in equilibrium long-term. Anglingkusumo (2005) used the vector error correlation model (VECM) approach to analyze the function of Indonesia's narrow money demand (M1/narrow money) in the 1981:Q1-2002:Q4 sample. The study shows that the money demand function is stable, but there is a co-break in money demand during the Asian financial crisis. As has been described, recent studies conducted on Indonesia's money demand state that there is an influence of structural changes on the stability of money demand, so it is necessary to include the effects of economic phenomena, such as policy changes and the influence of the 1997-1998 Asian crisis into the specification of Indonesia's money demand function.

Development of Money Demand Theory

The money demand model continues to evolve according to the development of money demand theory in determining the determinants of real money demand. Broadly speaking, real money demand is a function of variables that measure economic activity (scale variables) and variables that measure the opportunity cost of holding money that occurs when a person chooses to store his wealth in the form of money rather than other assets.

The theory of real money demand, often referred to as the theory of money quantity, was developed a hundred years ago by classical economists. Starting with the equation of exchange introduced by Irving Fisher (1911) which relates the quantity of money to nominal income, which was later developed by neoclassical economists, among others: opportunity cost. Keynes (1936) formulated these postulates by introducing a demand theory known as liquidity preference theory. This theory is built on three motives of society in holding money, namely transaction motives, speculation motives, and vigilant motives so that the demand for real money is a function of income levels and interest rates.

RESEARCH METHODS

The type of research used is descriptive. Descriptive research is research conducted to find out the value of independent variables, either one or more (independent) without making comparisons or connecting between one variable and another (Sugiyono, 2017: 59). This study uses one dependent variable and three independent variables. The dependent variables are the demand for real money, while the independent variables are the real Gross Domestic Product (GDP), the money market rate, and the rupiah exchange rate against the USD.

The approach used in this study is a quantitative approach. The process starts from a theory, then is derived into a research hypothesis accompanied by measurement and operational concepts, then empirical generalizations that rely on statistics, so that it can be concluded as research findings. This research method uses a descriptive qualitative research method. Where this research method is a research method that focuses on explaining the research object and discussion as it is carried out by means of observation/observation, interviews, and studying documents.

RESULTS AND DISCUSSION

The results of the estimation with four dummy variables resulted in the goodness of fit model measured with Adjusted R2 which is relatively not much different from the Adjusted R2 in the money demand model with three dummy variables. The coefficients of LNY, R, and LNER indicate the values corresponding to

expected sign, consistent with the results in the previous subchapter model. The ECT coefficient on each short-term adjustment model also showed significant value at a 95% confidence level. Where the same as the results obtained previously, the magnitude of the ECT coefficient indicates a degree of slow convergence adjustment. The results of parameter estimation also showed significant values for almost all dummy variables, except for the model with the Dummy III Technique, only the D3*LNER coefficient showed significant at a confidence level of 95%. This shows the significant influence of economic shocks that occurred due to the financial crisis in Asian countries in 1997-1998 Regarding the money demand model with four dummy variables, the stability of the

estimation parameters with the CUSUM and CUSUMQ tests was also seen. Figure 4.6 and Figure 4.7 show that the money demand equation that has been reconstructed by taking into account changes in the monetary policy framework results in a stable model for both long-term cointegration models and for short-term adjustments, even if the dummy variables for the period
It has no statistically significant effect.
The estimation results show that all money demand models, both with and without dummies, show the nature of slow convergence adjustments. This strongly reflects the slow nature of speed adjustment in developing countries, where inefficient policy-making often occurs.
When compared to the dummy without a dummy money demand model, it can be seen that with the inclusion of dummy variables into the money demand equation many variables become insignificant. In econometric analysis, this may occur due to an increase in the number of independent variables that cause a statistically reduced degree of freedom. Thus, there is a possible trade-off between choosing a stable model or a model with significant coefficients. In this study, to obtain a stable money demand model, the condition of many insignificant variables can be accepted. This is because the stability of money demand is very important in making monetary policy

Research Limitations

Based on the direct experience of researchers in conducting this research process, there are several limitations experienced and can be several factors so that they can be paid more attention to future researchers to further improve their research because this research itself certainly has shortcomings that need to be improved in future researches. Some of the limitations in the research include the following:

1. It is difficult to deepen the data. This is because the main tool in data collection is instruments, so that researchers find it difficult to get more data and what is written in it.
2. Long in the research planning process. Before seeking valid direct data, the researcher must prepare the research plan strictly in the form of a research proposal. This activity often takes a long time. There is a limited short research time.

CONCLUSION

The stability and predictability of money demand are very important in determining monetary decisions. Over the past three decades, there have been many changes in the Indonesian economy in general, and the monetary and financial sectors in particular, which have also affected the stability of money demand. Several previous studies have proven the influence of financial liberalization and the impact of the financial crisis that occurred during the period of the 1980s to the 1990s on the stability of Indonesia's money demand. This study estimates the demand for Indonesian money for the period 1980:Q1-2008:Q1, which differs from the results of the previous research is that this paper includes factors of change in the monetary policy framework to ITF which has been implemented since July 2005, in addition to this study estimates the demand for money with three different types of dummy variable estimation techniques.

The Error Correction Model method with the ARDL approach (1,1) produces a very significant value of the error correction term coefficient with a value indicating a slow convergence rate. The results of the coefficient estimation also show a significant influence of the 1997-1998 financial crisis on the demand for money, especially in the short-term adjustment model. The stability test showed that the money demand model with three dummy variables describing periods of financial liberalization and crisis was unable to produce stable estimation parameters. On the other hand, by incorporating factors in the change in the ITF's policy framework, the money demand model becomes stable. However, with the inclusion of dummy variables into the money demand equation, although the model becomes stable but many coefficients are insignificant. So it can be said that there is a possible trade-off between choosing a model with significant variables or a stable model. The stability of money demand was influenced by structural changes in the economy, namely financial and banking liberalization and the Asian financial crisis of 1997-1998.

SUGGESTIONS

Thus, it can be said that changes in economic policies and global financial and economic phenomena affect the stability of money demand and at the same time have an impact on the supply of money which is used as a tool for controlling price stability (in the inflation targeting framework).

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