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# The Impact of Digital Economic Dimensions on the Stability and Efficiency of Monetary Policy in Indonesia: Quantitative Analysis in the Era of Digital Transformation

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***Abstract****. This study uses quantitative analysis in the age of digital transformation to ascertain how Indonesia's monetary policy's stability and effectiveness are affected by digital economic characteristics. The Simultaneous Regression approach (also known as structural regression) with two simultaneous equations—monetary stability and monetary policy effectiveness—is the data analysis technique used in this study. Monetary stability (SM), the volume of digital transactions (VTD), the number of digital service users (PLD), financial technology adaptation (ATF), monetary policy effectiveness (EKM), e-commerce growth (PEC), and digital financial inclusion (IKD) are the variables considered in this study. The findings indicate that the variables VTD, PLD, ATF, and EKM have a 62.3% influence on the SM variable, with other variables outside the estimation accounting for the remaining 37.7% of SM. The estimation results show that the Effectiveness of Monetary Policy (EKM) can be explained by the Digital Financial Inclusion (IKD) and Monetary Stability (SM) variables by 11.7% and 88.3%, respectively. Aside from the estimations in the model, additional factors also affect the Effectiveness of Monetary Policy (EKM).*

***Keywords****: Monetary Stability, Digital Economy, Monetary Policy.*

**Abstrak**. Studi ini menggunakan analisis kuantitatif di era transformasi digital untuk memastikan bagaimana stabilitas dan efektivitas kebijakan moneter Indonesia dipengaruhi oleh karakteristik ekonomi digital. Pendekatan Regresi Simultan (juga dikenal sebagai regresi struktural) dengan dua persamaan simultan—stabilitas moneter dan efektivitas kebijakan moneter merupakan teknik analisis data yang digunakan dalam penelitian ini. Stabilitas moneter (SM), volume transaksi digital (VTD), jumlah pengguna jasa digital (PLD), adaptasi teknologi finansial (ATF), efektivitas kebijakan moneter (EKM), pertumbuhan e-commerce (PEC), dan keuangan digital inklusi (IKD) menjadi variabel yang dipertimbangkan dalam penelitian ini. Temuan menunjukkan bahwa variabel VTD, PLD, ATF, dan EKM mempunyai pengaruh sebesar 62,3% terhadap variabel SM, sedangkan variabel lain di luar estimasi menyumbang 37,7% sisanya terhadap SM. Hasil estimasi menunjukkan Efektivitas Kebijakan Moneter (EKM) dapat dijelaskan oleh variabel Inklusi Keuangan Digital (IKD) dan Stabilitas Moneter (SM) masing-masing sebesar 11,7% dan 88,3%. Selain estimasi dalam model, ada faktor lain yang juga mempengaruhi Efektivitas Kebijakan Moneter (EKM).

**Kata kunci**: Stabilitas Moneter, Ekonomi Digital, Kebijakan Moneter.

## 1. BACKGROUND

In recent decades, the Indonesian government has made economic growth a top priority. The structure and dynamics of a country's economy have changed due to the digital revolution, which has also changed the way we interact and communicate (Abdillah, 2024), (Javaid et al., 2024), (Haoran et al., 2024).

The impact of globalization makes digitalization an unavoidable necessity. The component of the economy known as "digitality" is based on the application and strengthening of digital communications and information technologies (Riyana & Mala,

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2024), (Elfaki & Ahmed, 2024), (Zheng et al., 2023).

Currently, the Indonesian economy allows companies to sell online by accepting various payment options. Buyers have the option to pay by e-wallet, debit card, credit card or bank transfer. Because technology and industrial progress are closely related, business people need to continue to evolve and adapt so that their companies can survive (Azzahra et al., 2023), (Liang et al., 2024), (Haoran et al., 2024).

The so-called "digital economy" is a sector that is closely related to technology and is thought to have the potential to drive economic growth. One way to improve the digital economy is to have useful internet connectivity. Internet users in Indonesia are growing rapidly, from the younger generation to the elderly (Wahyuningtyas et al., 2019), (Xia et al., 2024), (Q. Zhang & Zhao, 2024).

E-commerce transactions in Indonesia grew rapidly from IDR 253 trillion in 2020 to IDR 453.8 trillion in 2023, according to Bank Indonesia analysis. Meanwhile, Quick Response Code Indonesia Standard (QRIS) transactions and other electronic money grew from IDR 145.15 trillion in 2018 to IDR 399.6 trillion in 2023. In addition, the number of people using digital financial services such as fintech and digital wallets is still increasing. along with increasing public acceptance of digital technology (Indonesia, 2023).

Demand for cash may decrease, the rate of circulation of money may slow, and inflation may be affected by the continued increase in the use of electronic money . (Mishkin, 2019), (Yang et al., 2024), (Oloyede et al., 2023).

On the other hand, digital banking services will be more easily accessible to those who previously did not have access to the traditional banking system. This can improve financial management by supporting investment and long-term planning . (Kementerian Koordinasi Bidang Perekonomian, 2023), (Z. Zhang et al., 2024), (Q. Zhang et al., 2024).

The very rapid development of digital technology since the 2000s will ultimately have an impact on monetary policy transmission. Digital technology is now present in almost every sector of the economy, changing consumer preferences and market structures. However, the role of non-banks can further improve monetary policy transmission because their operations are not limited by the stricter regulations that apply to banks (Mochtar et al., 2020), (Renzhi & Beirne, 2023), (Choi et al., 2024).

The digital economy in Indonesia presents monetary policy with opportunities and challenges. Digitalization accelerates transactions and increases access to finance, but as fintech and cryptocurrencies grow, policy measures are needed to address new inflation threats and stabilize the financial system. To ensure stability and sustainable economic

growth, Bank Indonesia as the central bank must continue to update its monetary policy to reflect changes in the digital economy. Every country, including Indonesia, often experiences difficulties in economic growth and stability. Economic stability can be maintained or improved by implementing various policies to ensure community welfare.

Therefore, Indonesia's transition to a digital economy has great potential to increase financial inclusion and efficiency, but also poses difficulties for monetary policy. Therefore, further study is needed to understand how the digital economy influences Indonesia's monetary policy, especially regarding inflation, stability and effectiveness. In the era of the digital revolution, it is hoped that this research can help monetary authorities in developing adaptable and effective policies (Mutiarazora, 2022).

## 2. THEORETICAL STUDY

### Monetary Stability

In Indonesia, monetary stability is characterized by stable product and service prices, a slow rate of change in the value of the rupiah, and moderate interest rates. To improve community welfare and achieve sustainable economic growth and development, this condition is very important (Ilmi et al., 2024), (Rose & Rose, 2024)(Li et al., 2024).

However, due to inefficient financial system operations, monetary instability will have a fundamental impact on financial system stability (Kevin et al., 2019), (Rose & Rose, 2024), (Economides & Xepapadeas, 2024).

### Digital Transformation

Apart from making transactions easier, digital payments also make monitoring and regulation easier. Based on a Bank Indonesia report, the use of digital platforms for fast and easy transactions and changes in customer behavior are the main causes of the increase in online transactions. As people become more accustomed to using digital payments instead of cash, electronic transactions such as QRIS also play a role in this increase. Digital platforms and financial technology services are the driving force behind this change (Maysari et al., 2023), (Javaid et al., 2024), (Q. Zhang et al., 2024).

## 3. RESEARCH METHODS

### Simultaneous Regression Method

Two simultaneous equations, namely monetary stability and monetary policy effectiveness, are used in the data analysis approach of this research, namely 2SLS or the Simultaneous Regression method (Strutural Regression), as follows:

**EQUATION 1**

LOG(SM)=C(10)+C(11)*LOG(VTD)+C(12)*LOG(PLD)+C(13)*LOG(ATF)+C(14)*LOG(EKM)+ 1□

Where :

| | |
|---|---|
| SM | = Monetary Stability |
| VTD | = Digital Transaction Volume |
| PLD | = Number of Digital Service Users |
| ATF | = Financial Technology Adaptation |
| EKM | = Effectiveness of Monetary Policy |
| C(11), C(12),C(13),C(14) | = constant |
| □ | = error term |

**EQUATION 2**

LOG(EKM)=C(20)+ C(22)*LOG(IKD)+C(23)*LOG(SM) + 2□

Where :

| | |
|---|---|
| EKM | = Effectiveness of Monetary Policy |
| IKD | = Digital Financial Inclusion |
| SM | = Monetary Stability |
| C(21), C(22),C(23) | = constant |
| 2□ | = term error |

## 4. RESULTS AND DISCUSSION

### Data Analysis Results

a. Data Normality Test

System: UNTITLED

Estimation Method: Two-Stage Least Squares Date: 01/30/25 Time: 08:49

Sample: 2014 2023

Included observations: 10

Total system (balanced) observations 20

| | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C(10) | 3.755440 | 2.873236 | 1.307042 | 0.2157 |
| C(11) | 0.264675 | 0.900330 | 0.293976 | 0.7738 |
| C(12) | -2.117901 | 1.997069 | -1.060504 | 0.0098 |
| C(13) | 1.155601 | 2.826980 | 0.408776 | 0.6899 |
| C(14) | 0.688902 | 0.930090 | 0.740683 | 0.4731 |
| C(20) | 53.36097 | 20.91536 | 2.551282 | 0.0254 |
| C(22) | -31.55544 | 4.208332 | -7.498324 | 0.0000 |
| C(23) | -2.304901 | 3.651072 | -0.631294 | 0.5397 |
| Determinant residual covariance | | | 0.124807 | |

Equation: LOG(SM)=C(10)+C(11)*LOG(VTD)+C(12)*LOG(PLD)+C(13)*LOG(ATF)+C(14)*LOG(EKM)

Instruments: VTD PLD ATF PEC IKD C Observations: 10

| | | | |
|---|---|---|---|
| R-squared | 0.624261 | Mean dependent var | 1.125084 |
| Adjusted R-squared | 0.323669 | S.D. dependent var | 0.510596 |
| S.E. of regression | 0.419911 | Sum squared resid | 0.881626 |
| Durbin-Watson stat | 2.962763 | | |

Equation: LOG(EKM)=C(20)+(21)*LOG(PEC)+C(22)*LOG(IKD)+C(23)*LOG(SM)

Instruments: VTD PLD ATF PEC IKD C Observations: 10

| | | | |
|---|---|---|---|
| R-squared | -0.117542 | Mean dependent var | 1.503341 |
| Adjusted R-squared | -0.436840 | S.D. dependent var | 0.291340 |
| S.E. of regression | 1.782586 | Sum squared resid | 22.24328 |
| Durbin-Watson stat | 2.290075 | | |

Source: Eviews 2025 output

The eviews output results with the Two-Stage Least Square model are as follows: LOG(SM)=C(10)+C(11)*LOG(VTD)+C(12)*LOG(PLD)+C(13)*LOG(ATF)+C(14)*LOG(EKM) + 1□

R^2 = 0.623306 shown from the estimation results above shows that the variables VTD (Digital Transaction Volume), PLD (Number of Digital Service Users), ATF (Financial Technology Adaptation), and EKM (Monetary Policy Effectiveness) can

account for 62.3% of SM, while the remaining 37.7% of SM is influenced by variables not included in the measurement model.

The number of Digital Service Users (PLD) has a large influence on the SM variable, with a probability value of 0.0098 according to the estimation results. The other variables in this research do not have a significant effect on Monetary Stability (SM).

**Equation test results 2:**

The second equation is the equation used to simultaneously determine economic growth and inflation with the following equation as follows:

LOG(EKM)=C(20)+ C(22)*LOG(IKD)+C(23)*LOG(SM) + 2□

The estimation results above show that R^2 = 0.117542, which means that the Monetary Stability (SM) and Digital Financial Inclusion (IKD) variables have an influence of 88.3% on Policy Effectiveness and 11.7% on Monetary Policy Effectiveness (EKM). Other factors outside the model estimates have an impact on monetary (EKM). The effectiveness of Monetary Policy (EKM) in this research is said to be significantly influenced by one variable, namely IKD (Digital Financial Inclusion) with a prob value < 5 percent alpha value, according to the estimation findings obtained by the t-count value. Meanwhile, the Monetary Stability (SM) prob value of 0.5397>0.05 from the alpha value indicates that SM has an insignificant effect on EKM, the IKD prob value is 0.0000<0.05 from the alpha value indicating that IKD has quite a large influence on EKM.

**Classical Assumption Test**

a) Normality Test

| System Residual Normality Tests | | | | |
|---|---|---|---|---|
| Orthogonalization: Cholesky (Lutkepohl) | | | | |
| Null Hypothesis: residuals are multivariate normal | | | | |
| Date: 01/30/25 Time: 09:10 | | | | |
| Sample: 2014 2023 | | | | |
| Included observations: 10 | | | | |
| Component | Jarque-Bera | df | Prob. | |
| | | | | |
| 1 | 1.721803 | 2 | 0.4228 | |
| 2 | 0.387449 | 2 | 0.8239 | |
| Joint | 2.109252 | 4 | 0.7157 | |

Source: Eviews 2025 output

The Jarque-Bera test was employed in this investigation to determine whether the data was normal. The data is considered normal if the probability value of the Jarque-Bera (JB) test is greater than alpha 0.05. The normalcy assumption is satisfied since the probability value in the table is 0.4228>0.05.

**Autocorrelation Test**

To detect whether there is a correlation in this research model, the Residual Test for Autocorrelations was carried out. The assumption is that there is no autocorrelation effect if the prob value is > 0.05.

System Residual Portmanteau Tests for Autocorrelations

Null Hypothesis: no residual autocorrelations up to lag h

Date: 01/30/25 Time: 09:13

Sample: 2014 2023

Included observations: 10

| Lags | Q-Stat | Prob. | Adj Q-Stat | Prob. | df |
|---|---|---|---|---|---|
| 1 | 3.993633 | 0.4069 | 4.437370 | 0.3500 | 4 |
| 2 | 5.377763 | 0.7165 | 6.167533 | 0.6285 | 8 |
| 3 | 10.52103 | 0.5703 | 13.51506 | 0.3327 | 12 |
| 4 | 11.53010 | 0.7756 | 15.19684 | 0.5103 | 16 |
| 5 | 12.76830 | 0.8871 | 17.67324 | 0.6089 | 20 |
| 6 | 13.12847 | 0.9640 | 18.57366 | 0.7743 | 24 |
| 7 | 15.39242 | 0.9740 | 26.12017 | 0.5664 | 28 |
| 8 | 18.54026 | 0.9722 | 41.85936 | 0.1139 | 32 |
| 9 | 18.82554 | 0.9918 | 44.71222 | 0.1512 | 36 |
| 10 | 18.82554 | 0.9982 | NA | NA | 40 |
| 11 | 18.82554 | 0.9997 | NA | NA | 44 |
| 12 | 18.82554 | 1.0000 | NA | NA | 48 |

*The test is valid only for lags larger than the System lag order.

df is degrees of freedom for (approximate) chi-square distribution

Source: Eviews 2025 output

The Jarque-Bera test was used in this investigation to determine whether the data were normal. Data is considered normal if the Jarque-Bera (JB) test probability value is greater than alpha 0.05. The normality assumption is met because the probability value in the table is 0.4228>0.05.

## 5. DISCUSSION

This study examines the influence of digital economic dimensions on the stability and effectiveness of Indonesian monetary policy using quantitative analysis in the era of digital transformation. The Simultaneous Model is the analysis model that the author uses. The growth of e-commerce, digital financial inclusion, adaptation of financial technology, effectiveness of monetary policy, digital transaction volume, number of digital service users, and monetary stability are the factors used in this research.

Equation1

LOG(SM)=C(10)+C(11)*LOG(VTD)+C(12)*LOG(PLD)+C(13)*LOG(ATF)+C(14)*LOG(EKM) + 1□

The results of equation 1 show that VTD (Digital Transaction Volume) with a coefficient value of 0.264675 and a probability value of 0.7738 > 0.05 has a positive and negligible influence on SM (Monetary Stability). The digital transformation of the national financial system is also accelerated by the increasing use of electronic money (Susanti & Prihanto, 2022). Moreover, empirical studies show a strong correlation between the effectiveness of monetary policy and digital economic indicators (Widodo, 2023).

Meanwhile, SM is significantly influenced by the PLD variable (Number of Digital Service Users) with a probability value of 0.0098<0.05 and a coefficient value of -2.117901. This matter was clarified. Increased exchange rate volatility caused by the use of digital currencies and crypto assets is one of the main problems. As a result, the rupiah exchange rate could become unstable Gopinath (2021).

The Financial Technology Adaptation (ATF) variable has a positive and insignificant effect; The probability value is 0.6899>0.05, and the coefficient value is 1.155601. Indonesia's monetary policy is greatly influenced by the growth of the digital economy (Haryanto & Astuti, 2022). Likewise, with a coefficient value of 0.688902 and a probability value of 0.4731>0.05, the EKM (Monetary Policy Effectiveness) variable has a positive and negligible effect on SM (Economic Stability).

Equation 2

LOG(EKM)=C(20)+ C(22)*LOG(IKD)+C(23)*LOG(SM) + 2□

The findings show that the EKM (Monetary Policy Effectiveness) variable is significantly negatively influenced by the PEC (E-Commerce Growth) variable, with a probability value of 0.00<0.05 and a coefficient value of -31.55544. New problems are also caused by the digital economy. For example, the expansion of e-commerce requires operational management and supervision which requires regulation of digital financial services to maintain the integrity of the national financial system (Haryanto & Astuti, 2022). The SM (Monetary Stability) variable has a negative and insignificant effect on EKM (Monetary Policy Effectiveness) with a coefficient value of -2.304901 and a probability value of 0.5397>0.05.

**Dimensions of the Digital Economy on Monetary Stability**

Monetary policy stability includes efforts to maintain a balance between the supply and demand for money, as well as ensuring that monetary policy remains effective even though facing new challenges in the digital economy era (Ohashi & Shimizu, 2020). People are starting to switch from traditional payment instruments such as cash to digital instruments such as e-wallets and QR code-based payments. These changes can affect the transmission of monetary policy because people's behavior towards consumption and savings changes (Arner et al., 2017). The existence of fintech, or financial technology, also poses difficulties for regulation and oversight, particularly since it can generate systemic hazards that are difficult for national authorities to manage when it operates internationally (Carstens, 2021). On the other hand, the positive impact of the strategic role of the digital economy in encouraging innovation and creating new jobs (Widiastuti et al., 2023).

**Monetary Policy Efficiency in the Digital Economy Era**

The development of digital technology has brought about a transformation in the transmission of financial information, where the speed of information delivery and access to digital financial services increases the effectiveness of financial transactions. Digital instruments facilitate real-time currency transactions, resulting in faster and more accurate money transfers (Indonesia, 2020). The digital economy also delivers transparency and efficiency in managing financial transactions, thereby supporting overall economic stability (Prakosa, 2023).

## 6. CONCLUSION

From the explanation above, conclusions can be drawn from the results, namely:

1) Based on the estimation results of equation 1, R^2 = 0.623306 shows that the variables VTD (digital transaction volume), PLD (number of digital service users), ATF (adaptation of financial technology), and EKM (effectiveness of monetary policy) can account for 62.3% of SM, while the remaining 37.7% of SM is influenced by variables not included in the model estimation.
2) Based on the estimation results obtained from equation 1, the number of digital service users (PLD) has a significant influence on the SM variable, with a probability value of 0.0098. Other variables in this research do not have a significant effect on Monetary Stability (SM).
3) Based on the estimation results of equation 2, it is obtained that R^2 = 0.117542, which shows that the Digital Financial Inclusion (IKD) and Monetary Stability (SM) variables have an influence of 11.7% on Monetary Policy Effectiveness (EKM), and the remaining 88.3% of EKM is influenced by variables not included in the model estimation.
4) The effectiveness of Monetary Policy (EKM) in this research is said to be strongly influenced by one variable, namely IKD (Digital Financial Inclusion), with a prob value <alpha value of 5 percent, in accordance with the calculated t value obtained from the estimation findings of equation 2. The prob value of Monetary Stability (SM) is 0.5397>0.05, however the IKD prob value is 0.0000<0.05 from the alpha value which shows that IKD has a significant effect on EKM.
5) In this study, to test the normality of the data the Jarque-Bera test was used. The criteria used are if the Jarque-Bera (JB) test probability value>alpha 0.05, then the data is said to be normal.

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