

**ANALYSIS OF THE EFFECT OF ELECTRONIC MONEY  
TRANSACTIONS AND MACROECONOMIC VARIABLES ON  
ECONOMIC GROWTH IN INDONESIA**

**A THESIS**



by

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IN ECONOMIC DEVELOPMENT  
FACULTY OF BUSINESS AND ECONOMICS  
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## DECLARATION OF AUTHENTICITY

Herein, I declare this originality; I have neither presented anyone else's work from the university degree nor given anyone else's words, ideas, or expression without acknowledgment. All quotations are cited and listed in the bibliography of the thesis.

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Yogyakarta, 02 November 2024



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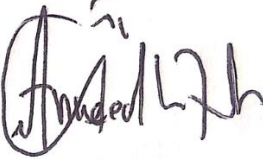
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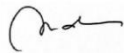
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## **MOTTO**

*Allah does not say life is easy. But Allah promises that with difficulty comes ease.*

(QS. Al – Insyirah: 5-6)

*And be patient; indeed the promise of Allah is true*

(Q.S Ar-Rum: 60)

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## ABSTRACT

This research examines the influence of electronic money payment methods and macroeconomic variables, namely money supply, domestic investment, foreign direct investment (FDI), and labor, on economic growth in Indonesia during the 2008-2023 period. The data used are secondary data obtained from official sources such as Bank Indonesia, the BPS (Central Bureau of Statistics), and the World Bank. The research approach in this study employs quantitative analysis using the *Autoregressive Distributed Lag* (ARDL) method. The results showed that electronic money transactions had a positive and significant effect in the short and long term on economic growth, variable money supply showed that it had a negative and significant effect in the short and long term on economic growth, domestic investment showed negative and insignificant results in the short and long term on economic growth, FDI showed negative and significant results in the short and long term on economic growth, and labor showed positive and significant results in both the short and long term on economic growth.

Keywords: Economic Growth, Electronic Money Transactions, Money Supply, Domestic Investment, FDI (*Foreign Direct Investment*), Labor, *ARDL*

## ABSTRAK

Penelitian ini bertujuan untuk mengkaji pengaruh penggunaan alat pembayaran dengan uang elektronik serta variable ekonomi makro, yaitu jumlah uang beredar, investasi dalam negeri, *foreign direct investment* (FDI), dan tenaga kerja, terhadap pertumbuhan ekonomi di Indonesia pada periode 2008-2023. Data yang digunakan merupakan data sekunder yang diperoleh dari sumber-sumber resmi seperti Bank Indonesia, Badan Pusat Statistik (BPS), dan World Bank. Pendekatan riset dalam penelitian ini menggunakan analisis kuantitatif dengan metode *Autoregressive Distributed Lag* (ARDL). Hasil penelitian menunjukkan bahwa transaksi uang elektronik berpengaruh positif dan signifikan dalam jangka pendek maupun jangka panjang terhadap pertumbuhan ekonomi, variable jumlah uang beredar menunjukkan bahwa berpengaruh negative dan signifikan dalam jangka pendek maupun jangka panjang terhadap pertumbuhan ekonomi, investasi dalam negeri menunjukkan hasil yang negative dan tidak signifikan dalam jangka pendek maupun jangka panjang terhadap pertumbuhan ekonomi, FDI menunjukkan hasil yang negative dan signifikan dalam jangka pendek maupun jangka panjang terhadap pertumbuhan ekonomi, dan tenaga kerja menunjukkan hasil positif dan signifikan baik dalam jangka pendek maupun jangka panjang terhadap pertumbuhan ekonomi.

Kata Kunci: Pertumbuhan Ekonomi, Transaksi Uang Elektronik, Jumlah Uang Beredar, Investasi Dalam Negeri, FDI (*Foreign Direct Investment*), Tenaga Kerja, *ARDL*

## CHAPTER I

### INTRODUCTION

#### 1.1 Background

Technology develops significantly every year. These developments and innovations impact convenience in carrying out various activities. In addition, technological developments have also impacted economic aspects, especially financial transactions. Financial transactions are now shifting from *offline* to *online* through digital *platforms*, which encourages people to make payment activities safely and quickly. (Ardana et al., 2023)

The emergence of financial transactions has resulted in the development of digital technology, commonly referred to as *financial technology*, which can be realised by implementing techniques between technology and information. *Financial Technology (Fintech)* is an innovation in financial services resulting from technological developments. The payment sector has the highest growth of *fintech* in Indonesia. The choice of digital technology was made because of the rapid change in technology needs caused by the rapid development of technology and people's lifestyles. (Ardana et al., 2023)

The development of payment systems is driven by the increasing volume and value of transactions, increased risk, transaction complexity, and technological advances. Along with the times and technology, payment systems that initially only used physical money have now developed into non-cash payments known as electronic money or e-money. Technological sophistication and advances certainly have an impact on the economy. The emergence of e-money as a legal tender in the real sector will have a positive and negative impact. Therefore, observation of electronic money is carried out periodically. This is by regulations provided by Bank Indonesia. (Rosanti et al., 2022)

**Figure 1. 1** Development of Electronic Money Transactions in Indonesia 2008-2023



Source: *Bank Indonesia*

Based on the graph above, it can be concluded that electronic money transactions in Indonesia have grown, especially in 2008-2011 and 2012-2023. Although from 2011 to 2012, there was a decline, the development rate was much higher (IDR 2,762,602,000.00) than the decline rate (IDR 979,326,000.00). This is because almost all banks have launched *e-money* products, and start-up companies are starting to emerge with *e-money* products such as Ovo in Tokopedia and Grab, GoPay in Gojek, ShopeePay in Shopee, and many other applications that are expected to continue to grow. Overall, the graph shows that the growth of electronic money in Indonesia is significant and has a positive impact on the economy in Indonesia.

Indonesia is one of the countries that is relatively fast adapting to the rapid digitisation of its economy. Indonesia has the potential to become a strong nation with its natural resources, geographical conditions, and additional potential owned by Indonesia. This potential must be utilised wisely to benefit the people of Indonesia. For Indonesia to participate in the global economic

wave of Industry 4.0, it must maintain its economic foundation and growth. This era supports a digital manufacturing approach on a surrogate network by integrating information from multiple sources and locations, which is then used to measure and distribute products physically. This era has also brought digitalisation in all fields (Aprilia et al., n.d.).

Indonesia's economy is experiencing rapid growth; based on the McKinsey Report, Indonesia ranks first as the country that recorded the fastest growth in adopting the digital economy (McKinsey, 2019). This is seen in three pillars: individual, business, and Government applications. The primary assessments are judged by availability and download speed, digital reach of data consumption per user, and digital use value in digital transactions (Aprilia et al., n.d.).

Economic growth is briefly defined as increasing output per capita in the long term. Economic growth is a process, not a picture of the economy at a time (one shot). The dynamic aspect of an economy is to see an economy as something that develops or changes over time (Budiono 1992: 1). According to Simon Kuznets, economic growth is a long-term increase in a country's ability to provide more and more types of economic goods to its people. This ability grows with technological progress and the necessary institutional and ideological adjustments.

Economic growth is one of the significant indicators to evaluate economic performance. In order to encourage economic growth, it is necessary to analyse macro variables that can be the basis for policy considerations to increase economic growth. In addition, the Government also uses monetary policy, such as paying attention to interest rates that can affect inflation rates, exchange rates, and the amount of money circulating in the community, to encourage economic growth. Based on the background above, the author wants to analyse the effect of electronic money transactions and macroeconomic variables on economic growth in Indonesia.

## **1.2 Research Problem**

The research questions are formulated in the following manner:

1. How do electronic money transactions affect economic growth in Indonesia?
2. How does money supply affect economic growth in Indonesia?
3. How does domestic investment affect economic growth in Indonesia?
4. How does *foreign direct investment (FDI)* affect economic growth in Indonesia?
5. How does labor affect economic growth in Indonesia?

## **1.3 Research Objectives**

Based on the issue that has been identified previously, the objectives of this research are as follows:

1. analyzing the effect of electronic money transactions on economic growth in Indonesia
2. analyzing the effect of money supply on economic growth in Indonesia
3. analyzing the effect of domestic investment on economic growth in Indonesia
4. analyzing the effect of *foreign direct investment (FDI)* on economic growth in Indonesia, and
5. analyzing the effect of labor on economic growth in Indonesia.

## **1.4 Research Benefits**

The outcomes of this research are expected to provide the following advantages.

1. This research is expected to help increase understanding of the effect of electronic money transactions on economic growth in Indonesia.
2. This research is expected to form the basis for formulating more effective and efficient public policies regarding electronic money transactions.

3. This research is expected to help strengthen economic growth in Indonesia by understanding the relationship between electronic money transactions and macroeconomic factors.
4. This research is expected to be used as a reference by parties who want to conduct in-depth research on the effect of electronic money transactions and the macro economy on economic growth in Indonesia.

### **1.5 Systematics of Writing**

The writing systematics are arranged in several sub-chapters to make it easier for readers to understand the contents of the research, namely as follows:

#### **1. CHAPTER I: INTRODUCTION**

The introductory chapter contains the background of the problem, problem formulation, research objectives, research benefits, and research systematics.

#### **2. CHAPTER II: LITERATURE REVIEW AND THEORETICAL FOUNDATION**

This chapter describes the review of previous studies, the theoretical basis as a reference in explaining the problem, and the research framework and hypotheses used.

#### **3. CHAPTER III: RESEARCH METHOD**

This chapter describes the types of data, data sources, and methods used in the research.

#### **4. CHAPTER IV: DATA ANALYSIS AND DISCUSSION**

This chapter analyses the data description, hypothesis testing, and discussion of research results.

## 5. CHAPTER V: CONCLUSION AND SUGGESTIONS

This chapter contains the author's conclusions and implications for policy.

## **CHAPTER II**

### **LITERATURE REVIEW AND THEORETICAL FOUNDATION**

#### **2.1 Literature Review**

This research uses previous research as a reference with the following explanation:

1. Research conducted by Ahmad et al. (2022) aims to analyse how much influence the digital economy, as seen by the Number of Internet Users (JPI), E-Commerce Transaction Value (NT), and the Number of E-Commerce Business Growth (JU), both partially and simultaneously on economic growth (PE) in Indonesia. The type of research used is Quantitative. The data used in this study is panel data, a combination of time series and cross-section data. The annual time series data is from 2018 to 2020, and the cross-section consists of 34 provinces in Indonesia using E-Views 10 tools. The data sources are the Central Statistics Agency (BPS) and the Indonesian Internet Service Providers Association (APJII). The analysis method used is a fixed-effect panel data regression model. The results showed that the independent variables of Transaction Value and Number of Businesses positively and significantly affected the dependent variable of economic growth or P.E. In contrast, the J.P.I. variable negatively and significantly affected economic growth.
2. Nila (2021) conducted a study aiming to analyse the digital economy's development in Indonesia and the threats posed by the digital economy from a national defence perspective. The research uses a descriptive qualitative method. Data were obtained from interviews with the Coordinating Ministry for Economic Affairs, the Ministry of Communication and Information, and the Ministry of Defense, supported by secondary data from these ministries. The results of the study explain that the development of Indonesia's digital economy is quite good, which contributes to Indonesia's GDP, increasing productivity, accelerating the flow of production, consumption, and

distribution, economic growth in various sectors and being able to survive the economy amid the COVID-19 pandemic. However, the digital economy also poses a threat to national defence where digitalisation causes all data to be connected to a server that is prone to data misuse and utilisation, unsafe transactions by malware-based cyberattacks, fraudulent transactions and hacking by hackers, and infrastructure constraints that have not reached all regions of Indonesia.

3. Merin (2021) conducted a study that aims to analyse the effect of ATM and debit cards, electronic money, inflation and tax revenue on economic growth in Indonesia both partially and simultaneously. This type of research uses a quantitative approach with multiple linear regression methods. The data used is secondary data taken from the publications of the Central Bureau of Statistics, Bank Indonesia and the Ministry of Finance of the Republic of Indonesia from 2012 to 2018. The results of hypothesis testing show that ATM and debit cards have a positive effect on economic growth, and electronic money has a positive effect on economic growth. While inflation does not affect economic growth, tax revenue does not affect economic growth. Simultaneously, economic growth is affected by A.T.M.s, debit cards, electronic money, inflation, and tax revenue.
4. Rismawan (2020) said that national economic growth that is relatively high is not necessarily detached from the existence of essential issues such as limited accumulation of national saving capital, domestic needs that are still highly dependent on imported goods, weak exports that rely on primary commodities, insufficient infrastructure development, and low quality of human resources that the Indonesian Government must address. This study aims to analyse the effect of Foreign Direct Investment (FDI) as an alternative source of development funds, the Human Development Index (HDI) as a proxy for the quality of human resources, and Macroeconomic conditions represented by Trade Balance (NX), a dummy of Economic

Crisis and Gross Fixed Capital Formation (GFCF) on Economic Growth in Indonesia. The data used is time-series data from 1985-2015 sourced from Statistics Indonesia and the World Bank. The analysis technique used in this research is the Error Correction Model (ECM). The results can be made in the following conclusions: 1) Foreign Direct Investment and Trade Balance have a negative and significant impact on Indonesia's long-term economic growth, but in the short term, they do not have any significant impact. 2) Human Development and Gross Fixed Capital Formation positively and significantly impact Indonesia's long-term and short-term economic growth. 3) Economic Crisis has a negative and significant impact both in the long term and short term.

5. Sheila et al. (2023) conducted a study to analyse the benefits of implementing QRIS as a payment method for UNNES students, given its potential to contribute to economic growth in the digital era. This research shows that QRIS offers several advantages for UNNES students: convenience, speed, and security in making payment transactions. With QRIS, students can make payments using their smartphones or other digital devices, eliminating the need for physical cash and reducing transaction costs. The researcher used a survey or questionnaire method in this research and used Google Forms to collect data. This research also uses data analysis techniques so that readers can easily understand the information in this article. The results showed that 75% of UNNES students have used QRIS. This is reinforced by almost more than 50% feeling helped by payments with this QRIS method. Users also do not find using QRIS as a payment method difficult. In conclusion, using QRIS can be effective for students in making payment transactions, which shows positive results such as increased transaction security, customer convenience in transactions, and economic growth.

6. Khodijah et al. (2022) researched the impact of the digital economy on economic growth in Indonesia. The research used a quantitative model to measure the role and influence of the digital economy on economic growth using a regression analysis model. The data used was secondary data sourced from BPS, BI, internet search, and other related sources. The results of the research show that the digital economy has business resilience and is significantly able to make a positive contribution to economic growth. The conclusions of this study show that the digital economy is an economic sector that will continue to proliferate in the future. There is a need for a complete digital economy database that can be accessed by researchers so that they can contribute ideas; in turn, the digital economy can play a role in business resilience and positively contribute to sustainable economic growth.
7. Dian et al. (2023) said innovations in the payment system that lead to non-cash payments (digital payment) can potentially impact output, prices, and monetary policy transmission that will drive the economy faster. However, in its work, there is a conspicuous lack of the role of digital payments in encouraging economic activity, especially for an emerging economy like Indonesia. This research aims to evaluate the impact of digital payment on economic growth and look at the influence of Government spending and inflation as control variables on economic growth. In reviewing this empirical concept, a quantitative analysis is applied to assess the research construct using a panel regression approach. The data used are sourced from Bank Indonesia and the Central Bureau of Statistics for the observation period from 2018 to 2021. Findings revealed the significance of each variable representing a positive impact of digital payments and inflation on economic growth, while Government spending harms economic growth.

8. Manopo (2017) conducted a study to analyse macroeconomic factors affecting Indonesia's economic growth. This research is a type of quantitative research that uses the Error Correction Model (ECM) approach. The data used for this study are in the form of quarters from January 2009 - December 2015. Macroeconomic factors analysed for their influence in this study are Inflation, Exchange Rate, Composite Stock Price Index (CSPI) and Prime Lending Rate. The model estimation used is multiple regression analysis with the O.L.S. method. The results showed that in the long term, the variables of Inflation, Exchange Rate, Jakarta Composite Index (J.C.I.), and Prime Lending Rate, both partially and simultaneously, have an insignificant influence on Indonesia's economic growth. In the short term, the variables of Inflation, Exchange Rate, Jakarta Composite Index (J.C.I.), and Prime Lending Rate partially have an insignificant influence on Indonesia's economic growth, and simultaneously, these variables significantly influence Indonesia's economic growth.

Here is the summary of the previous research analyses.

**Table 2. 1** Previous Research

| No | Researcher             | Variable                                                                                                                                  | Method                                             | Research Results                                                                                                                                                                                                                                                                |
|----|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Ahmad et al.<br>(2022) | <ul style="list-style-type: none"> <li>E-Commerce Transaction Value</li> <li>Number of Internet Users</li> <li>Economic Growth</li> </ul> | Panel Data Regression Method<br>Fixed-Effect Model | The results showed that the independent variables of transaction value and number of businesses positively and significantly affected the dependent variable of economic growth or P.E. In contrast, the J.P.I. variable negatively and significantly affected economic growth. |

| No | Researcher                | Variable                                                                                                                                                                                | Method                              | Research Results                                                                                                                                                                                                                                                                                                                                              |
|----|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2  | Nila et al. (2021)        | <ul style="list-style-type: none"> <li>• Digital Economy</li> <li>• Economy Defense</li> <li>• Economy Growth</li> <li>• Descriptive Qualitative</li> <li>• Covid-19</li> </ul>         | Descriptive Qualitative Method      | The study's results explain that Indonesia's digital economy is developing well, contributing to its GDP, increasing productivity, accelerating the flow of production, consumption, and distribution, economic growth in various sectors, and surviving the economy amid the COVID-19 pandemic.                                                              |
| 3  | Merin et al. (2021)       | <ul style="list-style-type: none"> <li>• A.T.M. and Debit Cards</li> <li>• Economic Growth</li> <li>• Inflation</li> <li>• Tax Revenue</li> <li>• Electronic Money</li> </ul>           | Multiple Linear Regression Method   | The results explain that A.T.M.s, debit cards, and electronic money positively affect economic growth. Meanwhile, inflation and tax revenue do not affect economic growth.                                                                                                                                                                                    |
| 4  | M. Rismawan et al. (2020) | <ul style="list-style-type: none"> <li>• Economic Growth</li> <li>• Foreign Direct Investment</li> <li>• Human Development</li> <li>• Macroeconomic Condition</li> <li>• ECM</li> </ul> | Error Correction Model (ECM) Method | The results of the study explained that:<br>1. Foreign Direct Investment and Trade Balance have a negative and significant impact on Indonesia's economic growth in the long term. Still, they, do not have a significant impact in the short term.<br>2. Human Development and Gross Fixed Capital Formation positively and significantly affect Indonesia's |

| No | Researcher             | Variable                                                                                                                                                                | Method                         | Research Results                                                                                                                                                                                             |
|----|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                        |                                                                                                                                                                         |                                | <p>long-term and short-term economic growth.</p> <p>3. The Economic Crisis has a negative and significant impact both in the long and short term.</p>                                                        |
| 5  | Sheila et al. (2023)   | <ul style="list-style-type: none"> <li>• QRIS</li> <li>• Payment</li> <li>• Economic Growth</li> <li>• UNNES Students</li> <li>• Easiness</li> </ul>                    | Survey or Questionnaire Method | The results explain that using QRIS can be effective for students in making payment transactions, with positive results such as increased transaction security, customer convenience, and economic growth.   |
| 6  | Khodijah et al. (2022) | <ul style="list-style-type: none"> <li>• Digital Economic</li> <li>• Economic Growth</li> <li>• Indonesia</li> <li>• OLS</li> </ul>                                     | Quantitative Method            | The results explain that the digital economy has business resilience and can contribute positively to economic growth.                                                                                       |
| 7  | Dian et al. (2023)     | <ul style="list-style-type: none"> <li>• Digital Payment</li> <li>• Economic Growth</li> <li>• Inflation</li> <li>• Government Spending</li> <li>• Indonesia</li> </ul> | Quantitative Method            | The results explain that the significance of each variable represents the positive impact of digital payments and inflation on economic growth, while Government spending is detrimental to economic growth. |

| No | Researcher    | Variable                                                                                                                                                                                      | Method                                                                 | Research Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8  | Manopo (2017) | <ul style="list-style-type: none"> <li>• Economic Growth</li> <li>• Inflation</li> <li>• Exchange Rate</li> <li>• Composite Stock Price Index (CSPI)</li> <li>• Prime Lending Rate</li> </ul> | Quantitative Method using <i>Error Correction Model</i> (ECM) approach | The study results explained that in the long term, the variables of Inflation, Exchange Rate, Jakarta Composite Index (JCI) and Prime Lending Rate, both partially and simultaneously, have an insignificant influence on Indonesia's economic growth. In the short term, the variables of Inflation, Exchange Rate, Jakarta Composite Index (JCI) and Prime Lending Rate partially have an insignificant influence on Indonesia's economic growth, and simultaneously, these variables significantly influence Indonesia's economic growth. |

## 2.2 Theoretical Foundation

### 2.2.1 Economic Growth

According to Todaro (2006), economic growth is defined as a process by which the production capacity of an economy increases over time to produce greater levels of income. According to Arsyad (2004), economic growth is defined as an increase in Gross Domestic Product / Gross National Product regardless of whether the increase is more significant or less than the Population growth rate or whether changes in economic structure occur. Meanwhile, according to Prasetyo (2009), economic growth is one of the macroeconomic indicators most often used by a country, especially a developing country. Economic growth indicators are considered eligible for use to determine the condition of a country's economy even though they cannot explain it well. (Baeti et al., 2013)

In the book entitled Macroeconomics, Mankiw (2007) says economic growth is one of the indicators that determines how successful a country's economic development is and is a determinant of further development policies. A country can experience economic growth if there is an increase in national income and an increase in output. The increase in national income can be seen in the yearly Gross Domestic Product (GDP) (Jeray et al., n.d.).

The measure of economic growth can be observed based on the country's GDP level. To calculate economic growth can be measured using the following formula (Machmud, 2016) in the journal Erni Febrina Harahap et al. 1 (2020)

$$g = \left( \frac{(PDB_1 - PDB_0)}{PDB_0} \right) 100\%$$

Where:

$g$  = Economic Growth Rate

$PDB_1$  = Current year real Gross Domestic Product

$PDB_0$  = Real Gross Domestic Product of the previous year

According to Todaro (2015), economic growth can be defined as an increase in a country's capacity to provide economic goods to its Population in the long term. The increase in capacity is determined by technological, institutional, and ideological progress toward various demands (Jeray et al., n.d.).

According to Mankiw (2015) in the journal Amalia (2022), a country can improve its living standards only if it has a high level of productivity to produce goods and services in large quantities. The factors that will affect the level of productivity, according to Mankiw, are as follows:

a. Physical Capital

Physical capital is one of the production elements utilised to produce goods and services, such as equipment or facilities, in the form of buildings and premises. Worker productivity can increase if the equipment needed for production is available, so more equipment is available that allows workers to complete tasks more efficiently and accurately.

b. Human Resources

Human resources are also one of the production elements that affect productivity levels. Therefore, human capital can increase a country's ability to produce goods and services. Human capital is evaluated through the knowledge and skills of workers obtained through education, training, and experience.

c. Natural Resources

For some countries, natural resources such as land, air, minerals, and other mining materials play an essential role as inputs to the production process. Differences in the availability of natural resources between countries will affect a country's standard of living.

d. Technology Knowledge

The fourth factor determining productivity is understanding technology to determine the best way to produce goods and services and increase production output.

### **2.2.2 Electronic Money Transactions**

Electronic Money Transactions refer to actions or activities carried out using computer devices, primarily through computer networks, with the help of other electronic media. The primary purpose of electronic money transactions is to facilitate humans in carrying out various daily activities.

The use of electronic money transactions is currently prevalent and covers a variety of purposes, including:

a. E-Commerce (Electronic Commerce)

According to Laudon and Trave, E-commerce is the use of the Internet, web, mobile applications, and browsers operating on mobile devices to conduct business transactions. This way, commercial transactions can be conducted digitally between organisations and individuals. This benefit of electronic commerce involves assisting computer users, including entrepreneurs (such as producers, merchants, and manufacturers) and consumers, to make purchases and sales of goods and services quickly and easily over the Internet.

b. E-Money

As an alternative payment method, electronic money is similar to cash and can be used by the public to make payments. Electronic money functions as a form of digital payment by using specific codes in payment transactions, and its value remains constant. The existence of electronic money provides convenience and efficiency and can be used globally, giving comfort to its users. To ensure its validity, the Government must recognise electronic money and pass approval from a financial supervisory institution appointed by the Government. This aims to provide convenience for users of electronic money.

c. E-Wallet

The growth in using electronic money as an alternative to making payments or purchases without using cash has increased, so the amount of electronic money owned by the community is usually referred to as a digital wallet. Digital wallets are electronic money product services that can be stored and used easily, quickly and safely.

Electronic money transactions involve various third parties as intermediaries in the process, which can be banks in physical or virtual

form. These transactions include sales, purchases, auctions, payments, and reservations, carried out through various means such as e-banking, SMS banking, internet banking, e-money, and other payments through outlets providing payment access. (Danuri et al., n.d.)

### **2.2.3 Money Supply**

Money is an object with a specific unit that can be used as legal tender in various transactions in a certain area. The amount of money in circulation is the result of multiplying primary money by the money multiplier. The size of the money supply in society can be described as a market process. In addition, money supply is related to deposit interest rates; the more money in circulation in society, the more attractive investment is compared to saving money.

The definition of money supply is divided into two types, namely:

a. Money in the narrow sense (M1)

Money in the narrow sense (narrow money) is money that is considered to have the highest liquidity.

b. Money in the broad sense (M2)

Money in the broad sense (broad money) consists of money in the narrow sense (M1) plus savings accounts (saving deposit) and time deposit accounts (time deposit).

### **2.2.4 Domestic Investment**

According to Investment Law No.25 of 2007, domestic investment is an activity conducted by domestic investors using domestic capital to conduct business in the territory of the Republic of Indonesia.

Domestic investment is considered to drive economic growth in developing countries effectively. Increased domestic investment is regarded as a factor that can positively contribute to economic

development, so if domestic investment increases, economic growth is also expected to increase. Domestic investment is part of the wealth of the Indonesian people, including rights and objects, whether owned by the state, national private companies, or foreign private companies operating in Indonesia. The capital is allocated or provided to run a business by the needs of the law. (Nadzir et,all., 2023)

#### **2.2.5 Foreign Direct Investment (FDI)**

Foreign Direct Investment (FDI) is a form of capital investment in tangible assets, which includes the construction of factories, the provision of various types of capital goods, the purchase of property for production purposes, expenditure on various inventories, and others. FDI occurs when a company from one country invests for some time in a company located in another country. Investments can be made wholly or partially by buying a foreign company already operating abroad, contributing funds or capital to establish a company abroad, or purchasing a 10.5% stake (Arsyad, 2015). The two ways FDI promotes economic growth are to increase the productivity of production factors and accumulate capital through technology diffusion.

#### **2.2.6 Labor**

Labor is the population that has or is working, looking for work, or doing other activities such as attending school and taking care of the household (Simanjuntak, 1985: 2). In practical terms, the distinction between labor and non-labor is based on age limits. According to the Labor Law, those in the labor category are those aged between 15 and 64.

According to Sudarsono in Eva Rosadi's journal, labor is human resources used to do work. Human resources, or human resources, have two meanings. First, they refer to work effort or services provided in the production process, which reflects the quality of a

person's efforts within a certain period of time to produce goods and services. Second, human resources refers to individuals capable of working and providing such services.

## **2.3 Relationship between Dependent Variable and Independent Variable**

### **2.3.1 The Effect of Electronic Money Transactions on Economic Growth**

Cashless payments are increasingly becoming a trend in Indonesian society, both in urban and rural areas. Non-cash money is considered more efficient as a means of payment and is the primary driver of economic growth today. In developed countries, financial transactions that support economic growth do not only use paper and metal money, but most have switched to non-cash payments. Electronic money (e-money) has various advantages, such as practicality, efficiency (fast transactions), transparency, ease of transactions, saving money management, and reducing the risk of theft and payment with counterfeit money.

Bank Indonesia realises that the payment system is essential in smoothly running community and business economic activities. The existence of payment systems as financial system infrastructure is a critical factor in supporting financial and monetary stability. Economic transactions can now change the current payment pattern, not only limited to cash but also involve electronic non-cash instruments that are more efficient and economical (Hastina, 2019).

Indonesia's digital economy has up-and-coming prospects if managed well because its growth exceeds the growth of the Indonesian economy. Indonesia is experiencing an overall increase in the digital economy, which is affecting the national economy. The digital economy is believed to be able to answer the challenges of unstable economic development (Tanjung et al., 2022).

### **2.3.2 The Effect of Money Supply on Economic Growth**

Money supply has a positive relationship with economic growth in Indonesia. There is a stable long-term relationship between government policy and economic growth. In the short term, money supply and credit as monetary variables are also related to economic growth. This means that in the same period, an increase in money supply will positively impact economic growth. In other words, the more money in circulation, the higher Indonesia's economic growth. The money supply positively and significantly affects economic growth. Based on Keynes' hypothesis, money supply positively affects output and economic growth. If there is an excess money supply, Bank Indonesia will lower interest rates. This encourages investment, which in turn increases output and accelerates economic growth.

### **2.3.3 The Effect of Domestic Investment on Economic Growth**

The theory of economic growth formulated by the Neo-Classical group highlights the vital role of capital in developing a country. Capital can come from domestic and foreign sources and is considered a factor that can drive a country's economy. Domestic investment, also known as domestic capital investment, can drive significant economic growth for developing countries. Increased investment in the country contributes positively to a country's economic growth. (Jufrida, 2016 in the journal Kambono et al., 2020).

Research conducted by Trisnu and Purbadarmaja (2014), Jufrida et al. (2016), Ibrahim and Dahie (2016), Emmanuel and Kehinde (2018), Mahrissa and Amar (2019), and Tran and Hoang (2019) confirmed that domestic investment has a significant positive impact on economic growth.

#### **2.3.4 The Effect of Foreign Direct Investment (FDI) on Economic Growth**

Foreign direct investment (FDI) plays a significant role in the economic development of developing countries. This impacts various aspects such as employment, production, prices, income, imports, exports, the welfare of the recipient country's people, and the balance of payments. Foreign investment is an essential economic growth source (Hussain and Haque, 2016, in the journal Kambono et al., 2020).

Purwanto and Mangeswari (2011). Lean and Tan (2011), Trisnu and Purbadharmaja (2014), Zekarias (2016), Ibrahim and Dahie (2016), Iamsiraroj (2016), Mahriza and Amar (2019), and Tran and Hoang (2019) noted in their research that foreign investment has a positive and significant impact on economic growth. (Kambono et al., 2020)

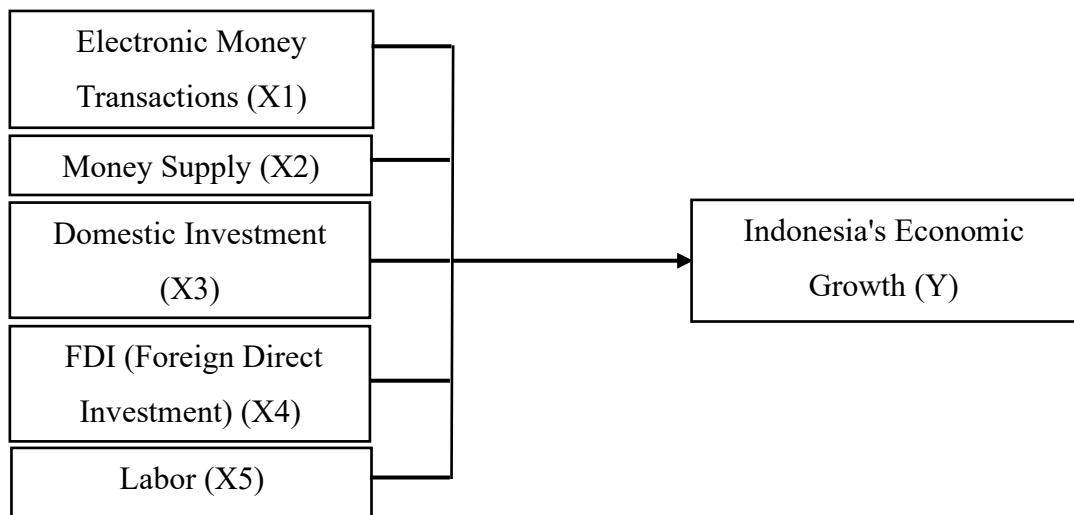
#### **2.3.5 The Effect of Labor on Economic Growth**

Labor is also one of the factors that affect a region's output. A large labor force is formed from a large population. However, population growth is feared to have a negative impact on economic growth. Todaro (2000) states that rapid population growth can trigger underdevelopment problems and alienate development prospects. In addition, it is stated that the large number of family members does not cause the population problem, but because the population is concentrated in urban areas due to the high migration rate from villages to cities.

## 2.4 Research Framework

This study aims to analyse the effect of electronic money transactions and macroeconomic variables on economic growth in Indonesia. The variables that were examined in this study are electronic money transactions, money supply, domestic investment, foreign direct investment (FDI), and labor as independent variables. Then, the economic growth variable is the dependent variable. The following is a conceptual framework for this research:

**Figure 2. 1** Research Framework



## **2.5 Research Hypothesis**

The hypothesis is a temporary conjecture on a problem, so the truth must be further proven. The hypotheses formulated in this study are as follows:

1. It is suspected that electronic money transactions have a positive effect on economic growth.
2. It is suspected that money supply positively affects economic growth.
3. It is suspected that domestic investment has a positive effect on economic growth.
4. It is suspected that foreign direct investment (FDI) positively affects economic growth.
5. It is suspected that labor positively affects economic growth.

## **CHAPTER III**

### **RESEARCH METHODS**

#### **3.1. Data and Data Source**

This research uses secondary data obtained from official data publications on the internet that are considered relevant, namely from the official websites of Bank Indonesia, the Central Bureau Statistics (BPS), the Financial Services Authority (OJK), and the World Bank. Secondary data is information obtained indirectly from reliable sources. The data used in this study is a time series from 2008 to 2023. This data processing is done using Eviews 12 software. The data includes economic growth, electronic money transactions, money supply, domestic investment, foreign direct investment (FDI), and labor.

The method used in this research is the *Auto-Regressive Distributed Lag Approach* (ARDL) of time series data. Time series data is a regression model that involves changes over time. This is done to see the effect of electronic money transactions, money supply, domestic investment, foreign direct investment (FDI), and labor on economic growth in Indonesia from 2008 to 2023. Time series data is often non-stationary, so regression results can show a high coefficient of determination even though there is no real relationship between the variables in the model (Widarjono, 2018). Non-stationary data often show an unbalanced relationship in the short term, but there is a possibility of a long-term relationship that can be recognized through cointegration tests. In the ARDL regression model, a stationarity test determines whether the variable is stationary.

### 3.2. Definition of Operational Variables

The author divides the variables used into two categories: dependent variables, or variables that are affected, and independent variables, or variables that influence. The dependent variable in this study is economic growth in Indonesia, while the independent variables used are electronic money transactions, money supply, domestic investment, foreign direct investment, and labor.

**Table 3. 1** Operational Variable Definition Table

| No | Variable                      | Operational Definition                                                                                                                                                                                                                                    | Period                                                           | Unit           |
|----|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------|
| 1  | Economic Growth               | Economic Growth is the long-term growth of a nation's capacity to produce goods and services for its people. This capacity relies on advances in production technology. Generally, growth is measured by increased national income (GNP, GDP) per capita. | Annual data for the period from 2008 to 2023 from the World Bank | US Dollar Rate |
| 2  | Electronic Money Transactions | Electronic Money transactions exchange or transfer monetary value using electronic media, such as prepaid cards, mobile applications, or digital payment platforms.                                                                                       | Annual Data for the period from 2008 to 2023 from Bank Indonesia | Billion Rupiah |

| No | Variable            | Operational Definition                                                                                                                                                                                                                                                                                                                                                                                                      | Period                                                                             | Unit           |
|----|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------|
| 3  | Money Supply        | The total amount of money available and circulating in society at a given time is used as a means of payment in various transactions. The money supply includes money circulating in the banking sector and the public and usually consists of primary money (such as notes and coins) and secondary money (such as deposits in banks). The money supply can be influenced by a monetary policy issued by the central bank. | Annual Data for the period from 2008 to 2023 from the Central Bureau of Statistics | Billion Rupiah |
| 4  | Domestic Investment | Domestic Investment is the investment or allocation of financial resources by individuals, companies, or governments within a country's borders to increase production capacity, create jobs, and promote economic growth.                                                                                                                                                                                                  | Annual Data for the period from 2008 to 2023 from the Central Bureau of Statistics | Billion Rupiah |

| No | Variable                        | Operational Definition                                                                                                                                                                                                               | Period                                                                             | Unit             |
|----|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------|
| 5  | FDI (Foreign Direct Investment) | Foreign Direct Investment is an investment made by individuals, companies, or governments from one country to another, where the investor gains significant ownership and control over assets or companies in the recipient country. | Annual Data for the period from 2008 to 2023 from the Central Bureau of Statistics | Kurs Dollar U.S. |
| 6  | Labor                           | People who are able to do work to produce goods or services, whether they are already working, looking for work, or doing other activities such as attending school or taking care of the household.                                 | Annual Data for the period from 2008 to 2023 from the Central Bureau of Statistics | Per cent         |

### 3.3. Data Analysis Method

This study uses the *Auto-Regressive Distributed Lag Approach* (ARDL) method processed using the Eviews 12 application, which can explain the developing relationship between the dependent and independent variables in the short and long term. The data is time series collected based on a specific research period from 2008 to 2023. ARDL is a time series data regression model that combines the current value of the explanatory variable with previous values (lag) and includes one or more lag values of the dependent variable associated with the explanatory variable (Ahmed, 2013).

### 3.3.1 Model Specifications

This study applies the *autoregressive distributed lag* (ARDL) method, which was used to find long-run and short-run equilibrium regression equations and evaluate the consistency of the model. In addition, the ARDL model does not depend on whether the variables are stationary at level (I (0)) or at first difference (I (1)) and is flexible in handling variables with different levels of integration. Data processing is done using Eviews 12 software. The general ARDL model is as follows:

$$Y_t = \alpha_0 + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{j=0}^q \beta_j X_{t-j} + \epsilon_t$$

Where:

- $Y_t$  is the dependent variable at time  $t$
- $X_t$  is the independent variable at time  $t$
- $\alpha_0$  is a constant
- $\alpha_i$  dan  $\beta_i$  are coefficients to be estimated
- $\epsilon_t$  is the error term
- $p$  is the number of lags of the dependent variable
- $q$  is the number of lags of the independent variable

### 3.3.2 Analysis Steps

The analysis steps using the ARDL method are as follows:

1. Conduct a Data Stationarity Test using a unit root test like the Augmented Dickey-Fuller (ADF). In testing data stationarity issues, the most widely used is the unit root test. The unit root test was first developed by Dickey-Fuller and is known as the Dickey-Fuller (DF) unit root test. The basic idea of the data stationarity test with the unit root test can be explained through the following model (Widarjono, 2018):

$$Y_t = \rho Y_{t-1} + \epsilon_t - 1 \leq \rho \leq 1$$

Where  $\epsilon_t$  is a random or stochastic disturbance variable with zero mean and constant variance and is not interconnected (non-autocorrelated) by the OLS method's assumptions, disturbance variables with these properties are called white noise. If the value of  $\rho=1$ , then the random (stochastic) variable  $Y$  has a unit root. If the time series data has a unit root, then the data moves randomly (random walk) and is considered non-stationary. Therefore, the data is considered non-stationary when doing a regression analysis of  $Y_t$  against lag  $Y_{t-1}$  and getting a value of  $\rho=1$ ; the data is considered non-stationary. This is the basic idea of the unit root test to determine whether the data is stationary.

If the data contains unit roots or not, Dickey-Fuller suggests using the regression model equation:

$$\begin{aligned}\Delta Y_t &= \rho Y_{t-1} + \epsilon_t \\ \Delta Y_t &= \beta_1 + \rho Y_{t-1} + \epsilon_t \\ \Delta Y_t &= \beta_1 + \beta_2 t + \rho Y_{t-1} + \epsilon_t\end{aligned}$$

Where  $t$  is the time trend variable.

In every model, if the time series data contains a unit root, then the data is not stationary, and the null hypothesis is  $\rho = 0$ . As for the alternative hypothesis  $\rho \neq 0$ , which means the data is stationary. The procedure to determine whether the data is stationary is to compare the value of the DF statistic with its critical value, the distribution statistic  $\tau$ . Dickey-Fuller developed the unit root test by including a higher A.R. element in his model and adding a lag of the difference variable on the right side of the equation, known as the Augmented Dickey-Fuller (ADF) test. This ADF test is used to determine whether the data is stationary. The DF test equation model is as follows:

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^p \beta_i \Delta Y_{t-i} + \rho_t$$

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \sum_{i=1}^p \beta_i \Delta Y_{t-1} + \rho_t$$

$$\Delta Y_t = \alpha_0 + \alpha T + \gamma Y_{t-1} + \sum_{i=1}^p \beta_i \Delta Y_{t-1} + \rho_t$$

Where Y= Observed variable

$$\Delta Y_t = Y_t - Y_{t-1}$$

T = time trend

To determine whether the data is stationary, the ADF value is compared with the critical value of the Mackinnon statistic distribution. The value of the statistic is determined based on the t-statistic of the coefficient  $\gamma Y_{t-1}$ . If the absolute value of ADF is more significant than its critical value, then the data under test is considered stationary. Conversely, the data is considered non-stationary if the ADF value is smaller.

## 2. Perform Cointegration Test

The cointegration test was used to test whether there is a long-term relationship between the independent and dependent variables. The cointegration test continues the stationarity test to see whether the regression residuals are stationary. If the variables are cointegrated, then there is a stable relationship in the long run. Conversely, the variables do not have a long-term relationship if they are not cointegrated. The bound testing approach is used for this cointegration test. Pesaran, Shin, and Smith (2011) introduced the bound testing cointegration test to find cointegration between variables in the model. The following is the hypothesis  $H_0$  and the alternative hypothesis  $H_a$  used to test for cointegration inbound testing:

$$H_0 = \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 \text{ (No cointegration)}$$

$$H_a = \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \text{ (There is cointegration)}$$

The null hypothesis states that there is no cointegration, while the alternative hypothesis states that there is cointegration. The next step is comparing the F-count value with the lower and upper critical values. If the F-count value is greater than the upper critical bound, then there is cointegration among the variables. Conversely, if the lower critical bound is greater than the F-count value, there is no cointegration between the studied variables. If the F-count value is between the lower and upper critical bound, then the decision on the presence or absence of cointegration becomes inconclusive.

### 3. Performing the *Autoregressive Distributed Lag* (ARDL) Test

The *Autoregressive Distributed Lag* (ARDL) test method is a dynamic test method in econometrics. The ARDL model combines the Autoregressive (AR) and Distributed Lag (DL) models. The advantage of using the ARDL model is that the stationarity of the data can be different, but no data is stationary in the second difference. In this study, the ARDL model estimation uses independent variables: Electronic Money Transactions, Money Supply, Labor, Domestic Investment, and FDI. At the same time, the dependent variable is Economic Growth. ARDL is denoted by the notation  $(p, q_1 \dots q_k)$  where  $p$  is the number of lags of the dependent variable,  $q_1$  is the number of lags of the first explanatory variable, and  $q_k$  is the number of lags of the following explanatory variable. To determine the ARDL model, deciding how many lags each variable should be included  $(p, q_1 \dots q_k)$  is essential. The amount of lag is determined based on the Akaike Information Criterion (AIC) value. If the AIC value is small in a particular model, then the number of lags will be selected. The testing steps in the ARDL regression model include a data stationarity test, cointegration test, and ARDL model estimation.

#### 4. Hypothesis Test Coefficient of Determination ( $R^2$ )

The  $R^2$  test estimates how much influence the dependent variable has on the independent variable. The  $R^2$  score has a range between zero and one. If the R-squared value is close to zero, it indicates that the ability of the independent variable to explain the dependent variable is limited. Conversely, if the value approaches one, the independent variable provides more significant information than the dependent variable. The coefficient of determination  $R^2$  is between 0 and 1. The coefficient of determination is close to 1; it can be said that the regression results are improving because it is easy to explain the data. Meanwhile, if the coefficient of determination is close to 0, the regression results are not good.

#### 5. F-Statistic Test

It is used to determine whether all independent variables included in the model have a joint influence on the dependent variable. The hypothesis in the F test is as follows:

- $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$  means that the independent variables together do not affect the dependent variable.
- $H_a$ : At least one of  $\beta_1, \beta_2, \beta_3, \beta_4$ , or  $\beta_5$  not equal to 0 means that the independent variables jointly affect the dependent variable.

At a certain level of significance, if the calculated F value is smaller than the critical F value, then  $H_0$  is accepted. This means that the independent variables together do not have a significant influence on the dependent variable. Conversely, if the calculated F value exceeds the critical F value, we reject  $H_0$ . This indicates that the independent variables jointly affect the dependent variable significantly.

## 6. T Test

The T-test assesses how much influence the independent variable has on the dependent variable by controlling for other independent variables. The hypothesis used in the T-test is:

- $H_0: \beta_1 = 0$  means that there is no individual influence of the first independent variable on the dependent variable.
- $H_a: \beta_1 > 0$  means an individual positive effect of the first independent variable on the dependent variable.
- $H_0: \beta_2 = 0$ , meaning that there is no individual influence of the second independent variable on the dependent variable.
- $H_a: \beta_2 > 0$ , meaning that the second independent variable positively affects the dependent variable.

In this context,  $H_0$  indicates that the independent variable has no individually significant effect on the dependent variable. Conversely,  $H_a$  suggests a significant positive impact of the independent variable on the dependent variable individually.

## 7. Classical Assumption Test

The classical assumption test usually discusses normality, heteroscedasticity, and autocorrelation. If the classical assumptions above are deviated from, the F and T tests will be invalid.

### a. Heteroscedasticity Test

This study was done to overcome the problem when there were variables with non-constant disturbance variance. If the disturbance in the variable does not have a mean of zero, it does not affect the *slope* but the intercept (Widarjono, 2009). Models affected by heteroscedasticity remain biased and consistent but are no longer optimal (*best*) (Hakim, 2014). There are various ways to test for heteroscedasticity problems, including the White Test, Park Test, and Glejser Test with the following hypothesis:

$$H_0 = \text{homoscedasticity}$$

$H_1$  = heteroscedasticity

b. Normality Test

The normality test is conducted to determine whether the residuals are normally distributed because the t-significance test to measure the effect of the independent variable on the dependent variable will be valid if the residuals are normally distributed (Widarjono, 2013). In this study, the normality test used the Jarque-Berra (J-B) test with a significance level of  $\alpha = 1\%$ ,  $5\%$ , and  $10\%$ . The following is the hypothesis for the normality test:

$H_0$  = residuals are normally distributed.

$H_1$  = residuals are not normally distributed.

c. Autocorrelation Test

The Autocorrelation test is used to detect a correlation between the variables in the study. The existence of autocorrelation shows the correlation between observations at different times (Widarjono, 2013), which causes the estimator to no longer be *BLUE* (*Best, Linear, Unbiased*) because the variance is no longer minimum. This study uses the Breusch-Godfrey Serial Correlation L.M. Test to determine whether autocorrelation exists in the model. The following is the autocorrelation test hypothesis:

$H_0$  = no autocorrelation

$H_1$  = there is autocorrelation

## CHAPTER IV

### DATA ANALYSIS AND DISCUSSION

#### 4.1 Data Description

This quantitative study utilizes secondary data from Bank Indonesia, World Bank, BPS (Central Bureau of Statistics), and databases. This study focuses on the effect of electronic money transactions from 2008-2023 in Indonesia. This section will explain the results of data analysis of the variables used in the study and the discussion to answer the formulation of the problem that has been prepared. The analysis method uses two models, namely *Autoregressive Distributed Lag* (ARDL), with data processing through Eviews 12 software.

#### 4.2 Data Processing Results and Analysis

##### 4.2.1 Stationarity Test (Unit Root)

**Table 4. 1** Stationarity Test Results at Level

| Variable                      | ADF       | Prob   | Interpretation |
|-------------------------------|-----------|--------|----------------|
| GDP                           | -3.046093 | 0.0532 | Not Stationary |
| Electronic Money Transactions | 3.314583  | 1.0000 | Not Stationary |
| Money Supply                  | 2.739872  | 0.9999 | Not Stationary |
| FDI                           | 0.264075  | 0.9673 | Not Stationary |
| Domestic Investment           | -3.498704 | 0.0235 | Stationary     |
| Labor                         | -2.531488 | 0.1281 | Not Stationary |

*Source: data processing Eviews 12 (2024)*

Based on Table 4.1 above, the estimation results of the unit root test using the Augmented Dickey-Fuller (ADF) test at the level stage indicate that only one variable is stationary. The GDP variable has a probability value of 0.0532, which is greater than  $\alpha = 5\%$  (0.05), meaning that the GDP variable can be considered non-stationary. The Electronic Money Transactions

variable has a probability value of 1.0000, which is greater than  $\alpha = 5\%$  (0.05), meaning that the Electronic Money Transactions variable can be considered non-stationary. The Money Supply variable has a probability value of 0.9999, which is greater than  $\alpha = 5\%$  (0.05), meaning that the Money Supply variable can be considered non-stationary. The Labor variable has a probability value of 0.1281, which is greater than  $\alpha = 5\%$  (0.05), meaning that the Labor variable can be considered non-stationary. On the other hand, the Domestic Investment variable has a probability value of 0.0235, which is smaller than  $\alpha = 5\%$  (0.05), meaning that the Domestic Investment variable can be considered stationary. Therefore, researchers can continue the root test at the *first different (1st Diff)* levels.

In the stationarity test, if the data is not yet stationary at the level, researchers can conduct a degree of integration test. This test aims to determine at what degree or order the data becomes stationary. This test is similar to the unit root test at the level level, namely by comparing the absolute value of the ADF statistic with the Mackinnon critical value. If the ADF absolute value is smaller than the Mackinnon critical value, then the data is considered stationary. Conversely, the data is not considered stationary if the ADF absolute value is greater than the Mackinnon critical value. This test uses an alpha ( $\alpha$ ) significance level of 5% (0.05). The hypothesis used in this test is:

$$H_0: \delta = 0 \text{ (There is a unit root, not stationary).}$$

$$H_a: \delta \neq 0 \text{ (No unit root, stationary).}$$

Suppose the A.D.F. absolute value is greater than the critical value and the probability value is smaller than the alpha ( $\alpha$ ) significance level. In that case, the null hypothesis ( $H_0$ ) is rejected, indicating that the data tested is stationary. Conversely, suppose the ADF absolute value is smaller than the critical value, and the probability value is greater than the alpha ( $\alpha$ ) significance level. In that case, the alternative hypothesis

(Ha) is accepted, which means that the data tested is not stationary. The following are the results of testing the first degree of integration using the ADF test.

**Table 4. 2** Stationarity Test Results on First Difference

| Variable                      | ADF       | Prob   | Interpretation |
|-------------------------------|-----------|--------|----------------|
| GDP                           | -3.359066 | 0.0352 | Stationary     |
| Electronic Money Transactions | 1.382202  | 0.9968 | Not Stationery |
| Money Supply                  | -3.811957 | 0.0153 | Stationary     |
| FDI                           | -3.206277 | 0.0415 | Stationary     |
| Domestic Investment           | -5.454976 | 0.0008 | Stationary     |
| Labor                         | -3.120476 | 0.0482 | Stationary     |

*Source: data processing Eviews 12 (2024)*

Table 4.2 presents the results of the stationarity test at the first difference level using the ADF test, which reports the absolute ADF values and probability values at a significance level of alpha ( $\alpha$ ). Based on the stationarity test results using the ADF unit root test at the first difference level (*1st Diff*) for the variables GDP, Money Supply, FDI (*Foreign Direct Investment*), Domestic Investment, and Labor, the probability values are all below 0.05 at a significance level of  $\alpha = 5\%$ . Therefore, these variables are considered stationary. So, the next step is to conduct a cointegration test to determine the long-term relationship between these variables.

#### **4.2.2 Autoregressive Distributed Lag (ARDL) Estimation Results**

After conducting a unit root test using the ADF test, the results show that some variables are stationary at levels I (0) and others at the first difference I (1). Next, the researcher conducted a cointegration test showing a long-term relationship between the variables. The next

step is to conduct an *Autoregressive Distributed Lag* (ARDL) test to analyse the relationship between these variables in the short term.

**Table 4. 3** *Autoregressive Distributed Lag* (ARDL) Estimation Test Results

| Dependent Variable: D(GDP)                                         |             |                       |             |           |
|--------------------------------------------------------------------|-------------|-----------------------|-------------|-----------|
| Method: ARDL                                                       |             |                       |             |           |
| Date: 11/20/24 Time: 12:56                                         |             |                       |             |           |
| Sample (adjusted): 2010 2023                                       |             |                       |             |           |
| Included observations: 14 after adjustments                        |             |                       |             |           |
| Maximum dependent lags: 1 (Automatic selection)                    |             |                       |             |           |
| Model selection method: Akaike info criterion (AIC)                |             |                       |             |           |
| Dynamic regressors (1 lag, automatic): D(LABOR) D(MS) D(EMT) D(DI) |             |                       |             |           |
| D(FDI)                                                             |             |                       |             |           |
| Fixed regressors: C                                                |             |                       |             |           |
| Number of models evaluated: 32                                     |             |                       |             |           |
| Selected Model: ARDL(1, 0, 0, 1, 0, 1)                             |             |                       |             |           |
| Variable                                                           | Coefficient | Std. Error            | t-Statistic | Prob.*    |
| D(GDP(-1))                                                         | 0.057846    | 0.043582              | 1.327294    | 0.2418    |
| D(LABOR)                                                           | 1.414873    | 0.456504              | 3.099369    | 0.0269    |
| D(MS)                                                              | -5.32E-06   | 7.57E-07              | -7.030091   | 0.0009    |
| D(EMT)                                                             | -1.377312   | 0.054949              | -25.06543   | 0.0000    |
| D(EMT(-1))                                                         | 2.499766    | 0.110572              | 22.60768    | 0.0000    |
| D(DI)                                                              | -3.90E-09   | 3.38E-07              | -0.011538   | 0.9912    |
| D(FDI)                                                             | -9.47E-05   | 3.96E-05              | -2.392587   | 0.0622    |
| D(FDI(-1))                                                         | -0.000137   | 1.99E-05              | -6.892769   | 0.0010    |
| C                                                                  | 2.268369    | 0.383172              | 5.919978    | 0.0020    |
| R-squared                                                          | 0.997413    | Mean dependent var    |             | 0.028571  |
| Adjusted R-squared                                                 | 0.993274    | S.D. dependent var    |             | 2.629545  |
| S.E. of regression                                                 | 0.215653    | Akaike info criterion |             | 0.025801  |
| Sum squared resid                                                  | 0.232531    | Schwarz criterion     |             | 0.436623  |
| Log likelihood                                                     | 8.819396    | Hannan-Quinn criter.  |             | -0.012229 |
| F-statistic                                                        | 240.9791    | Durbin-Watson stat    |             | 1.772688  |
| Prob(F-statistic)                                                  | 0.000005    |                       |             |           |

\*Note: p-values and any subsequent tests do not account for model selection.

*Source: Eviews 12 Data Processing Results (2024)*

The Coefficient of Determination R-squared ( $R^2$ ) measures how much influence the independent variable has on the dependent variable. If the R-squared value is close to zero, the independent variable only slightly explains the dependent variable. Conversely, if the value is close to one, the independent variable significantly explains the dependent variable. Table 4.4 shows the R-squared value of 0.997413. This means that the R-

squared is close to one, so the independent variables, namely Electronic Money Transactions, Money Supply, FDI (*Foreign Direct Investment*), Domestic Investment, and Labor, are able to explain the Economic Growth variable by 97%, while the remaining 3% is influenced by other variables outside the model.

#### 4.2.3 Cointegration Test Bound Test Approach

The cointegration test is an advanced stage of the unit root test, which aims to test whether there is a long-term relationship between the independent and dependent variables. In this study, researchers used the bound test method for the cointegration test because five independent variables were not stationary in the unit root test at the level. In contrast, one independent variable was still not stationary at the first difference level. For ARDL estimation to be carried out, the data in this study must show cointegration. The hypothesis used in the cointegration bound test is as follows:

$$H_0: \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 \text{ (No cointegration)}$$

$$H_a: \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \text{ (There is cointegration)}$$

The following cointegration test results are shown in the table below:

**Table 4. 4** Cointegration Test Results

| Test Statistics      | Value           | K               |
|----------------------|-----------------|-----------------|
| F-Statistic          | 499.0990        | 5               |
| Critical Value Bonds |                 |                 |
| Significance         | Lower Bound (0) | Upper Bound (1) |
| 10%                  | 2.08            | 3               |
| 5%                   | 2.39            | 3.38            |
| 2.5%                 | 2.7             | 3.73            |
| 1%                   | 3.06            | 4.15            |

*Source: Eviews 12 Data Processing Results (2024)*

Based on Table 4.4, it can be seen that the comparison of the F-statistic with the lower bound and upper bound values at the  $\alpha = 5\%$  significance level shows that the F-statistic value of 499.0990 is greater than the lower bound value of 2.39 and the upper bound of 3.38. Therefore, the null hypothesis ( $H_0$ ) is rejected, which means that the variables in this study have long-run cointegration. This indicates that changes in the GDP variable are influenced by the independent variables of Electronic Money Transactions, Money Supply, FDI (*Foreign Direct Investment*), Domestic Investment, and Labor.

#### 4.2.4 F-Statistic Test

The F-statistic test shows whether all the independent variables in the model together or simultaneously affect the dependent variable. The hypothesis in the F test is as follows:

- a.  $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ , means that the independent variables together do not affect the dependent variable.

- b.  $H_a: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$ , means that the independent variables jointly affect the dependent variable.

**Table 4. 5** F-Statistic Test Results

|                    |          |                       |           |
|--------------------|----------|-----------------------|-----------|
| R-squared          | 0.997413 | Mean dependent var    | 0.028571  |
| Adjusted R-squared | 0.993274 | S.D. dependent var    | 2.629545  |
| S.E. of regression | 0.215653 | Akaike info criterion | 0.025801  |
| Sum squared resid  | 0.232531 | Schwarz criterion     | 0.436623  |
| Log likelihood     | 8.819396 | Hannan-Quinn criter.  | -0.012229 |
| F-statistic        | 240.9791 | Durbin-Watson stat    | 1.772688  |
| Prob(F-statistic)  | 0.000005 |                       |           |

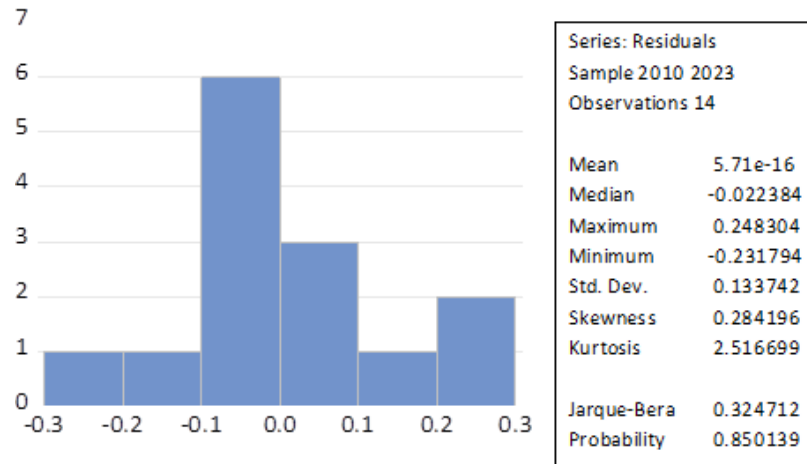
\*Note: p-values and any subsequent tests do not account for model selection.

*Source: Eviews 12 Data Processing Results (2024)*

Based on the table above, it can be seen that the calculated F value is 240.9791, and the Prob value is. 0.000005 < 0.05, then  $H_0$  is rejected, and  $H_a$  is accepted, meaning that Electronic Money Transactions, Money Supply, Domestic Investment, FDI (*Foreign Direct Investment*), and Labor affect Economic Growth.

## 4.2.5 Classical Assumption Test

### 4.2.5.1 Normality Test Results



*Source: data processing Eviews 12 (2024)*

Based on the results in graph 4.1, the Probability value is 0.850139 > 0.05, so it can be concluded that the data is normally distributed.

### 4.2.5.2 Autocorrelation Test

**Table 4. 6** Breusch-Godfrey Autocorrelation Test Results

|               |          |                      |        |
|---------------|----------|----------------------|--------|
| F-Statistic   | 0.195281 | Prob. F (2,3)        | 0.8323 |
| Obs*R-squared | 1.612675 | Prob. Chi-Square (2) | 0.4465 |

*Source: data processing Eviews 12 (2024)*

Based on Table 4.6 above, it can be concluded that the probability value is 0.8323, which is greater than 0.05, and there is no autocorrelation.

#### 4.2.5.3 Heteroscedasticity Test

**Table 4. 7** Heteroskedasticity Test Results

|                     |          |                      |        |
|---------------------|----------|----------------------|--------|
| F-Statistic         | 2.954867 | Prob. F (8,5)        | 0.1240 |
| Obs*R-squared       | 11.55578 | Prob. Chi-Square (8) | 0.1722 |
| Scaled explained SS | 1.117770 | Prob. Chi-Square (8) | 0.9974 |

*Source: Eviews 12 Data Processing Results (2024)*

Based on table 4.7 above, it is found that the probability value of 0.1722 is greater than  $\alpha = 5\%$  and fulfills the assumption of homoscedasticity or non-heteroscedasticity.

#### 4.2.6 Short-term ARDL Estimation

ARDL in the short term was used to determine whether there is a short-term relationship between the independent and dependent variables.

**Table 4. 8** Short-Term Estimation Test Results

| Variable    | Coefficient | Std. Error | t-Statistic | Prob.  |
|-------------|-------------|------------|-------------|--------|
| C           | 2.268369    | 0.383172   | 5.919978    | 0.0020 |
| D(GDP(-1))* | -0.942154   | 0.043582   | -21.61820   | 0.0000 |
| D(LABOR)**  | 1.414873    | 0.456504   | 3.099369    | 0.0269 |
| D(MS)**     | -5.32E-06   | 7.57E-07   | -7.030091   | 0.0009 |
| D(EMT(-1))  | 1.122454    | 0.062020   | 18.09823    | 0.0000 |
| D(DI)**     | -3.90E-09   | 3.38E-07   | -0.011538   | 0.9912 |
| D(FDI(-1))  | -0.000232   | 4.99E-05   | -4.647155   | 0.0056 |
| D(EMT,2)    | -1.377312   | 0.054949   | -25.06543   | 0.0000 |
| D(FDI,2)    | -9.47E-05   | 3.96E-05   | -2.392587   | 0.0622 |

*Source: data processing Eviews 12 (2024)*

The short-term effect of the independent variable on the dependent variable can be interpreted as follows:

a. Electronic Money Transaction Variable

In the Electronic Money Transaction variable, it is known that the coefficient value has a positive effect of 1.122454. The probability value 0.0000 is smaller than  $\alpha = 5\%$ , significantly affecting Economic Growth.

b. Money Supply Variable

In the Money Supply variable, it is known that the coefficient value has a negative effect of -5.32E-06. The probability value of 0.0009 is smaller than  $\alpha = 5\%$ , significantly affecting Economic Growth.

c. Domestic Investment

In the Domestic Investment variable, it is known that the coefficient value has a negative effect of -3.90E-09. The probability value of 0.9912 is greater than  $\alpha = 5\%$ , so it does not significantly affect Economic Growth.

d. Foreign Direct Investment (FDI)

In the FDI (*Foreign Direct Investment*) variable, it is known that the coefficient value has a negative effect of -0.000232. The probability value of 0.0056 is more minor than  $\alpha = 5\%$ , so it significantly affects Economic Growth.

e. Labor

In the labor variable, it is known that the coefficient value has a positive effect of 1.414873. The probability value of 0.0269 is more minor than  $\alpha = 5\%$ , significantly affecting Economic Growth.

#### 4.2.7 Long-term ARDL Estimation

**Table 4.9** Long-Term Estimation Test Results

| Variable                                                                                                    | Coefficient | Std. Error | t-Statistic | Prob.  |
|-------------------------------------------------------------------------------------------------------------|-------------|------------|-------------|--------|
| D(LABOR)                                                                                                    | 1.501742    | 0.491773   | 3.053728    | 0.0283 |
| D(MS)                                                                                                       | -5.65E-06   | 7.97E-07   | -7.084337   | 0.0009 |
| D(EMT)                                                                                                      | 1.191369    | 0.098928   | 12.04277    | 0.0001 |
| D(DI)                                                                                                       | -4.14E-09   | 3.59E-07   | -0.011539   | 0.9912 |
| D(FDI)                                                                                                      | -0.000246   | 5.93E-05   | -4.156061   | 0.0089 |
| C                                                                                                           | 2.407640    | 0.417944   | 5.760675    | 0.0022 |
| EC = D(GDP) - (1.5017*D(LABOR) -0.0000*D(MS) + 1.1914*D(EMT) -<br>0.0000<br>*D(DI) -0.0002*D(FDI) + 2.4076) |             |            |             |        |

*Source: data processing Eviews 12 (2024)*

The estimation results in the table above show the coefficient value and probability of each variable, so it can be concluded that:

a. Electronic Money Transaction Variable

The Electronic Money Transaction variable shows a coefficient value of 1.191369 and a probability of 0.0001, which means that in the long run, it has a positive and significant effect on the economic growth variable.

b. Money Supply Variable

The Money Supply variable shows a coefficient of -5.65000006 and a probability of 0.0009, which means that in the long run, the variable money supply has a negative and significant effect on the variable Economic growth.

c. Domestic Investment Variable

The Domestic Investment variable shows a coefficient value of -4.14E000009 and a probability of 0.9912, which means that in the

long run, it has a negative and insignificant effect on the economic growth variable.

d. Foreign Direct Investment Variable

The Foreign Direct Investment variable shows a coefficient of - 0.000246 and a probability of 0.0089, which means that in the long run, the FDI variable has a negative and significant effect on the Economic growth variable.

e. Labor Variable

The Labor variable shows a coefficient value of 1.501742 and a probability of 0.0283, which means that in the long run, it has a positive and significant effect on the economic growth variable.

### **4.3 Long-term and Short-term Economic Analysis**

#### **4.3.1 Analysis of the Effect of Electronic Money Transactions on Economic Growth**

The statistical test results obtained on the electronic money transaction variable amounted to 1.122454 with a probability of 0.0000 which means it is smaller than 0.05, which means that changes in the positive significant effect on economic growth in the short term allow full for any changes to occur. While in the long term, the statistical test results obtained amounted to 1.191369 with a probability of 0.0001 which means that electronic money transactions have a positive and significant effect on economic growth in the long term. The results in this study indicate conformity between the hypothesis which states that there is an alleged positive effect of electronic money transactions on economic growth in Indonesia. The results of the analysis show that electronic money transactions have a positive and significant effect on economic growth. The higher the electronic money transactions increase, the higher the economic growth.

This is supported by research conducted by Nando (2015) in Febriaty's journal that increasing cash payments encourages economic growth and increases the money supply. This shows that with the increasing use of non-cash payment systems that continue to grow today, the role of cash in society is starting to shift. Moreover, in the digital era as it is now, innovations in non-cash payment systems are growing, so as to encourage economic growth through substitution effects and increased efficiency in the economy.

#### **4.3.2 Analysis of Money Supply on Economic Growth in Indonesia**

The statistical test results obtained on the variable money supply amounted to -5.3200006 with a probability of 0.0009 or smaller than 0.05, which means that changes in money supply on economic growth in the short term have a negative and significant effect. In the long term, the statistical test results obtained amounted to -5.65000006 with a probability of 0.0009 or smaller than 0.05, which means that the money supply has a negative and significant effect in the long term. An increase in the amount of money in circulation can encourage economic growth. As the amount of money in circulation increases, people tend to allocate some of their funds for consumption. As a result, producers will increase the production of goods, which in turn increases the demand for factors of production. This, in turn, leads to an increase in per capita income, contributing to economic growth.

This finding is also in accordance with the results of previous research conducted by Tiwa (2016), which shows that the money supply influences economic growth. An increase in the money supply can encourage an increase in investment, which in turn will have a positive impact on economic growth.

There is similar research conducted by Ambarwati (2021), where an increase in the amount of money in circulation can encourage economic growth. This happens because, with increased money in circulation,

people tend to use some of their funds for consumption. As a result, producers will increase the production of goods, which triggers increased demand for production factors. This condition will impact increasing consumption, business productivity, and per capita income, contributing to economic growth.

#### **4.3.3 Analysis of Domestic Investment in Economic Growth in Indonesia**

The statistical test results on the domestic investment variable amounted to -3.9000009 with a probability value of 0.9912, which means greater than 0.05, which means that changes in the domestic investment variable have a negative and insignificant effect in the short term. In the long term, the statistical test results obtained amounted to -4.14000009 with a probability of 0.9912 or greater than 0.05, which means that the domestic investment variable has a negative and insignificant effect on economic growth in the long term. This is because an increase in domestic investment does not directly stimulate all sectors of the economy. As explained earlier, economic growth is the cumulative result of overall economic activity. Domestic investment from a small group of domestic elites causes inequality, which leads to decreased purchasing power and ultimately hampers economic growth. In addition, the pandemic factor has also noticeably weakened domestic support. In times of crisis, economic actors tend to hold back and reduce spending, resulting in a significant decline in purchasing power.

The results of this study contradict the findings of previous research (Asiyan, 2020) which states that domestic investment has no effect on economic growth. This is due to fluctuations in domestic investment caused by a lack of investor confidence and poor infrastructure governance. On the other hand, the results of this study differ from the findings of Arifah (2022) which show that domestic investment has a positive effect on economic growth. The concept of increasing a country's economic growth is determined by savings and investment. Domestic

investment, which is an investment with a domestic source of funds, plays a role in encouraging economic activity in the country and helping to advance the economy.

#### **4.3.4 Analysis of FDI (*Foreign Direct Investment*) on Economic Growth in Indonesia**

The statistical test results on the FDI variable amounted to -0.000232 with a probability of 0.0056 or smaller than 0.05, which means that changes in FDI on economic growth in the short term have a negative and significant effect. In the long term, the statistical test results obtained amounted to -0.000246 with a probability of 0.0089 or smaller than 0.05, which means that FDI has a negative and significant effect in the long term.

In line with research conducted by Agma (2015), where the presence of foreign direct investment can encourage infrastructure improvement. This is done to facilitate the distribution process for companies that receive investment from abroad. The goal is to reduce price disparities that occur in various regions in Indonesia. If these problems can be overcome, the level of public consumption will increase, which in turn will support economic growth. In addition, the influx of foreign direct investment also has an impact on increasing a country's exports. This is related to the transfer of technology that can improve the quality and quantity of products produced. Once domestic needs are met, these products can be exported to various countries. Thus, foreign direct investment contributes to economic growth through increasing skilled human resources through higher education, developing infrastructure to support the distribution of production, and increasing exports.

#### **4.3.5 Analysis of Labor on Economic Growth in Indonesia**

The statistical test results obtained on the labor variable are 1.414873 with a probability of 0.0269 or smaller than 0.05, which means that

changes in labor on economic growth in the short term have a negative and significant effect. While in the long term, the statistical test results obtained amounted to 1.501741 with a probability of 0.0283 or smaller than 0.05, which means that labor has a positive and significant effect in the long term. To encourage economic growth by paying attention to the labour aspect, labour can develop through the increasing population, work experience, and education. Therefore, a group of individuals ready to work and actively seeking work is required, known as the labour force. A person is considered engaged in work if they perform certain activities, such as being a worker or employee. The labor force, which consists of individuals active in the process of producing goods or services, plays an important role in driving the economy.

This is in line with research conducted by Purwanggono (2015), where the use of labor in the production process has a relationship with production costs and wage levels. In terms of production cost and wage level, labor demand is influenced by labor productivity and the return obtained from production factors. The addition of labor will increase productivity, which is the impact of changes in the quantity and quality of labor itself. This in turn can encourage economic growth.

## CHAPTER V

### CONCLUSIONS AND SUGGESTIONS

#### 5.1 Conclusion

This research is a quantitative study that examines the influence between independent variables, namely Electronic Money Transactions, Money Supply, Domestic Investment, FDI (*Foreign Direct Investment*), and Labor on Economic Growth in Indonesia in 2008-2023 using the ARDL (*Autoregressive Distributed Lag*) analysis method. After processing the data with statistical methods and analysis, this research produces the following conclusions:

1. Electronic Money Transactions have a significant short-term and long-term effect on economic growth in Indonesia.
2. The Money Supply, in the short term and in the long term, has a significant effect on economic growth in Indonesia.
3. Domestic investment, both in the short term and in the long term, has no significant effect on economic growth in Indonesia.
4. FDI (*foreign direct investment*) in the short and long term significantly affects economic growth in Indonesia.
5. Labor in the short and long term significantly affects economic growth in Indonesia.

#### 5.2 Suggestions

Based on the points in the conclusion above, the following suggestions are given by the author as follows:

1. It is expected that the Government needs to develop infrastructure and regulations that support the wider adoption and sustainable use of electronic money by improving digital literacy, transaction security, and more equitable access in various regions so that the positive impact of using electronic money is expected to last longer and be sustainable.
2. As the monetary authority, Bank Indonesia is expected to maintain the amount of money in circulation at an optimal level to support economic

growth without triggering excessive inflation. Adaptive monetary policy is needed to the dynamics of global and domestic economic conditions to ensure economic stability.

3. To support stable and sustainable economic growth, the government should prioritize domestic investment with greater incentives while still selectively attracting FDI. FDI needs to be directed to high-value-added sectors to bring in capital and increase local economic capacity, technology transfer, and employment. This combination of policies will create an optimal balance for Indonesia's economic growth.
4. The government is expected to improve the quality of human resources so that more qualified labor can be absorbed by the labor market and encourage economic growth.

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## APPENDICES

### Appendix 1 Data on Economic Growth, Electronic Money Transactions, Money Supply, Domestic Investment, FDI and Labor

| Yearly | Y<br>(%) | X1<br>(Miliar) | X2<br>(Miliar) | X3<br>(Miliar) | X4<br>(US\$) | X5<br>(%) |
|--------|----------|----------------|----------------|----------------|--------------|-----------|
| 2008   | 6        | 0.00168        | 1.859.839      | 120.363        | 14.871       | 91.54     |
| 2009   | 4.6      | 0.01139        | 2.141.383.7    | 537.799        | 10.815       | 91.86     |
| 2010   | 6.2      | 0.00152        | 2.471.205.79   | 560.626        | 16.214       | 92.59     |
| 2011   | 6.2      | 0.02154        | 2.877.219.57   | 476.000        | 19.474       | 93.04     |
| 2012   | 6        | 0.04327        | 3.304.644.62   | 692.182        | 24.564       | 93.63     |
| 2013   | 5.6      | 0.06381        | 3.730.197.02   | 328.150        | 28.617       | 94.12     |
| 2014   | 5        | 0.07285        | 4.173.326.5    | 556.126        | 28.529       | 94.3      |
| 2015   | 4.9      | 0.11594        | 4.548.800.27   | 699.465        | 29.275       | 94.19     |
| 2016   | 5        | 0.15502        | 5.004.976.79   | 216.230        | 28.964       | 94.5      |
| 2017   | 5.1      | 0.27146        | 5.419.165.05   | 262.350        | 32.239       | 94.67     |
| 2018   | 5.2      | 1.03582        | 5.760.046.2    | 328.604        | 29.307       | 94.9      |
| 2019   | 5        | 3.18581        | 6.136.552      | 368.498        | 28.208       | 95.02     |
| 2020   | -2.1     | 11.0818        | 6.900.049.49   | 113.535        | 28.666       | 95.06     |
| 2021   | 3.7      | 17.2596        | 7.870.452.85   | 447.063        | 31.093       | 93.74     |
| 2022   | 5.3      | 25.8479        | 8.528.022.31   | 552.769        | 45.605       | 94.17     |
| 2023   | 5        | 40.8186        | 8.826.531      | 674.923        | 50.267       | 94.55     |

Source: World Bank, Bank Indonesia, Databook, and Central Bureau of Statistics (BPS).

## Appendix 2 Stationarity Test Results

### a. Level Stationarity Test

Group unit root test: Summary  
Series: GDP, LABOR, MS, EMT, DI, FDI  
Date: 11/20/24 Time: 12:54  
Sample: 2008 2023  
Exogenous variables: Individual effects  
Automatic selection of maximum lags  
Automatic lag length selection based on SIC: 0 to 2  
Newey-West automatic bandwidth selection and Bartlett kernel

| Method                                                        | Statistic | Prob.** | Cross-sections | Obs |
|---------------------------------------------------------------|-----------|---------|----------------|-----|
| <u>Null: Unit root (assumes common unit root process)</u>     |           |         |                |     |
| Levin, Lin & Chu t*                                           | 4.94835   | 1.0000  | 6              | 88  |
| <u>Null: Unit root (assumes individual unit root process)</u> |           |         |                |     |
| Im, Pesaran and Shin W-stat                                   | 5.08277   | 1.0000  | 6              | 88  |
| ADF - Fisher Chi-square                                       | 17.5481   | 0.1301  | 6              | 88  |
| PP - Fisher Chi-square                                        | 21.2414   | 0.0470  | 6              | 90  |

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

### b. First Difference Level Stationarity Test

Group unit root test: Summary  
Series: GDP, LABOR, MS, EMT, DI, FDI  
Date: 11/20/24 Time: 12:55  
Sample: 2008 2023  
Exogenous variables: Individual effects  
Automatic selection of maximum lags  
Automatic lag length selection based on SIC: 0 to 2  
Newey-West automatic bandwidth selection and Bartlett kernel

| Method                                                        | Statistic | Prob.** | Cross-sections | Obs |
|---------------------------------------------------------------|-----------|---------|----------------|-----|
| <u>Null: Unit root (assumes common unit root process)</u>     |           |         |                |     |
| Levin, Lin & Chu t*                                           | -0.49949  | 0.3087  | 6              | 78  |
| <u>Null: Unit root (assumes individual unit root process)</u> |           |         |                |     |
| Im, Pesaran and Shin W-stat                                   | -1.68530  | 0.0460  | 6              | 78  |
| ADF - Fisher Chi-square                                       | 33.6818   | 0.0008  | 6              | 78  |
| PP - Fisher Chi-square                                        | 61.7189   | 0.0000  | 6              | 84  |

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

### Appendix 3 ARDL Test Results

Dependent Variable: D(GDP)  
Method: ARDL  
Date: 11/20/24 Time: 12:56  
Sample (adjusted): 2010 2023  
Included observations: 14 after adjustments  
Maximum dependent lags: 1 (Automatic selection)  
Model selection method: Akaike info criterion (AIC)  
Dynamic regressors (1 lag, automatic): D(LABOR) D(MS) D(EMT) D(DI)  
D(FDI)  
Fixed regressors: C  
Number of models evaluated: 32  
Selected Model: ARDL(1, 0, 0, 1, 0, 1)

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.*    |
|--------------------|-------------|-----------------------|-------------|-----------|
| D(GDP(-1))         | 0.057846    | 0.043582              | 1.327294    | 0.2418    |
| D(LABOR)           | 1.414873    | 0.456504              | 3.099369    | 0.0269    |
| D(MS)              | -5.32E-06   | 7.57E-07              | -7.030091   | 0.0009    |
| D(EMT)             | -1.377312   | 0.054949              | -25.06543   | 0.0000    |
| D(EMT(-1))         | 2.499766    | 0.110572              | 22.60768    | 0.0000    |
| D(DI)              | -3.90E-09   | 3.38E-07              | -0.011538   | 0.9912    |
| D(FDI)             | -9.47E-05   | 3.96E-05              | -2.392587   | 0.0622    |
| D(FDI(-1))         | -0.000137   | 1.99E-05              | -6.892769   | 0.0010    |
| C                  | 2.268369    | 0.383172              | 5.919978    | 0.0020    |
| R-squared          | 0.997413    | Mean dependent var    |             | 0.028571  |
| Adjusted R-squared | 0.993274    | S.D. dependent var    |             | 2.629545  |
| S.E. of regression | 0.215653    | Akaike info criterion |             | 0.025801  |
| Sum squared resid  | 0.232531    | Schwarz criterion     |             | 0.436623  |
| Log likelihood     | 8.819396    | Hannan-Quinn criter.  |             | -0.012229 |
| F-statistic        | 240.9791    | Durbin-Watson stat    |             | 1.772688  |
| Prob(F-statistic)  | 0.000005    |                       |             |           |

\*Note: p-values and any subsequent tests do not account for model selection.

## Appendix 4 Cointegration Test Results

ARDL Long Run Form and Bounds Test  
 Dependent Variable: D(GDP,2)  
 Selected Model: ARDL(1, 0, 0, 1, 0, 1)  
 Case 2: Restricted Constant and No Trend  
 Date: 11/20/24 Time: 12:56  
 Sample: 2008 2023  
 Included observations: 14

| Conditional Error Correction Regression |             |            |             |        |
|-----------------------------------------|-------------|------------|-------------|--------|
| Variable                                | Coefficient | Std. Error | t-Statistic | Prob.  |
| C                                       | 2.268369    | 0.383172   | 5.919978    | 0.0020 |
| D(GDP(-1))*                             | -0.942154   | 0.043582   | -21.61820   | 0.0000 |
| D(LABOR)**                              | 1.414873    | 0.456504   | 3.099369    | 0.0269 |
| D(MS)**                                 | -5.32E-06   | 7.57E-07   | -7.030091   | 0.0009 |
| D(EMT(-1))                              | 1.122454    | 0.062020   | 18.09823    | 0.0000 |
| D(DI)**                                 | -3.90E-09   | 3.38E-07   | -0.011538   | 0.9912 |
| D(FDI(-1))                              | -0.000232   | 4.99E-05   | -4.647155   | 0.0056 |
| D(EMT,2)                                | -1.377312   | 0.054949   | -25.06543   | 0.0000 |
| D(FDI,2)                                | -9.47E-05   | 3.96E-05   | -2.392587   | 0.0622 |

\* p-value incompatible with t-Bounds distribution.  
 \*\* Variable interpreted as  $Z = Z(-1) + D(Z)$ .

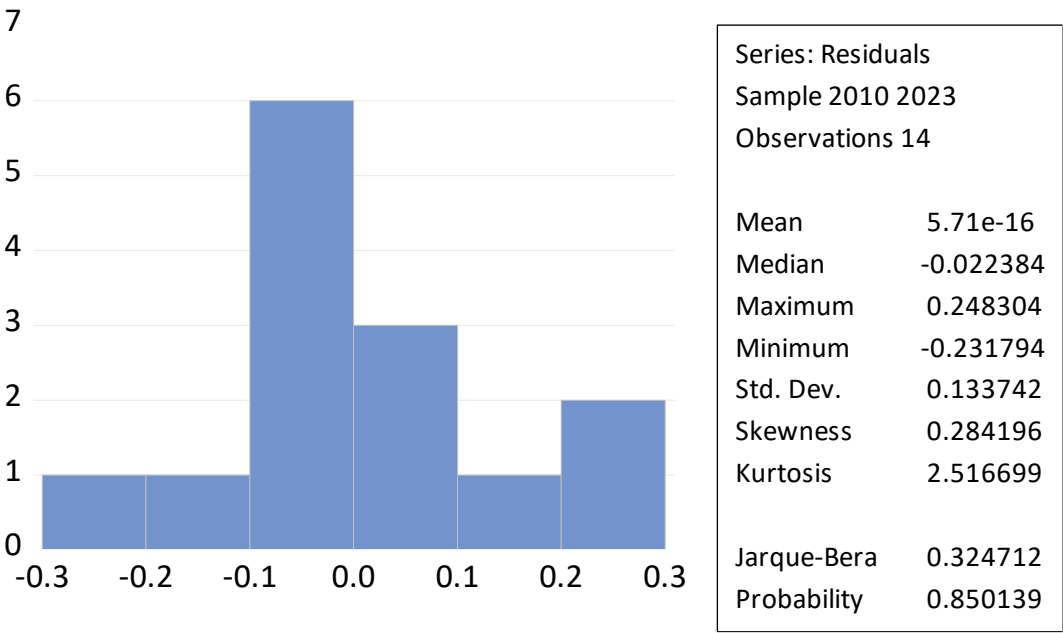
| Levels Equation<br>Case 2: Restricted Constant and No Trend |             |            |             |        |
|-------------------------------------------------------------|-------------|------------|-------------|--------|
| Variable                                                    | Coefficient | Std. Error | t-Statistic | Prob.  |
| D(LABOR)                                                    | 1.501742    | 0.491773   | 3.053728    | 0.0283 |
| D(MS)                                                       | -5.65E-06   | 7.97E-07   | -7.084337   | 0.0009 |
| D(EMT)                                                      | 1.191369    | 0.098928   | 12.04277    | 0.0001 |
| D(DI)                                                       | -4.14E-09   | 3.59E-07   | -0.011539   | 0.9912 |
| D(FDI)                                                      | -0.000246   | 5.93E-05   | -4.156061   | 0.0089 |
| C                                                           | 2.407640    | 0.417944   | 5.760675    | 0.0022 |

EC = D(GDP) - (1.5017\*D(LABOR) -0.0000\*D(MS) + 1.1914\*D(EMT) -0....  
 \*D(DI) -0.0002\*D(FDI) + 2.4076)

| F-Bounds Test       |          | Null Hypothesis: No levels relationship |       |       |
|---------------------|----------|-----------------------------------------|-------|-------|
| Test Statistic      | Value    | Signif.                                 | I(0)  | I(1)  |
| Asymptotic: n=1000  |          |                                         |       |       |
| F-statistic         | 499.0990 | 10%                                     | 2.08  | 3     |
| k                   | 5        | 5%                                      | 2.39  | 3.38  |
|                     |          | 2.5%                                    | 2.7   | 3.73  |
|                     |          | 1%                                      | 3.06  | 4.15  |
| Finite Sample: n=35 |          |                                         |       |       |
| Actual Sample Size  | 14       | 10%                                     | 2.331 | 3.417 |
|                     |          | 5%                                      | 2.804 | 4.013 |
|                     |          | 1%                                      | 3.9   | 5.419 |
| Finite Sample: n=30 |          |                                         |       |       |
|                     |          | 10%                                     | 2.407 | 3.517 |
|                     |          | 5%                                      | 2.91  | 4.193 |
|                     |          | 1%                                      | 4.134 | 5.761 |

Appendix 5 Classical Assumption Test Results

a. Normality Test Results



## b. Heteroscedasticity Test Results

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

|                     |          |                     |        |
|---------------------|----------|---------------------|--------|
| F-statistic         | 2.954867 | Prob. F(8,5)        | 0.1240 |
| Obs*R-squared       | 11.55578 | Prob. Chi-Square(8) | 0.1722 |
| Scaled explained SS | 1.117770 | Prob. Chi-Square(8) | 0.9974 |

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/20/24 Time: 12:58

Sample: 2010 2023

Included observations: 14

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.  |
|--------------------|-------------|-----------------------|-------------|--------|
| C                  | -0.017912   | 0.025411              | -0.704903   | 0.5123 |
| D(GDP(-1))         | 0.007190    | 0.002890              | 2.487546    | 0.0553 |
| D(LABOR)           | 0.050389    | 0.030274              | 1.664420    | 0.1569 |
| D(MS)              | 1.01E-07    | 5.02E-08              | 2.013592    | 0.1002 |
| D(EMT)             | -0.009256   | 0.003644              | -2.540133   | 0.0519 |
| D(EMT(-1))         | 0.012949    | 0.007333              | 1.765891    | 0.1377 |
| D(DI)              | 3.84E-08    | 2.24E-08              | 1.713061    | 0.1474 |
| D(FDI)             | -8.24E-06   | 2.62E-06              | -3.139066   | 0.0257 |
| D(FDI(-1))         | 1.30E-06    | 1.32E-06              | 0.983075    | 0.3707 |
| R-squared          | 0.825413    | Mean dependent var    | 0.016609    |        |
| Adjusted R-squared | 0.546073    | S.D. dependent var    | 0.021227    |        |
| S.E. of regression | 0.014302    | Akaike info criterion | -5.400783   |        |
| Sum squared resid  | 0.001023    | Schwarz criterion     | -4.989960   |        |
| Log likelihood     | 46.80548    | Hannan-Quinn criter.  | -5.438812   |        |
| F-statistic        | 2.954867    | Durbin-Watson stat    | 2.098784    |        |
| Prob(F-statistic)  | 0.123981    |                       |             |        |

### c. Autocorrelation Test Results

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

|               |          |                     |        |
|---------------|----------|---------------------|--------|
| F-statistic   | 0.195281 | Prob. F(2,3)        | 0.8323 |
| Obs*R-squared | 1.612675 | Prob. Chi-Square(2) | 0.4465 |

Test Equation:

Dependent Variable: RESID

Method: ARDL

Date: 11/20/24 Time: 12:57

Sample: 2010 2023

Included observations: 14

Presample missing value lagged residuals set to zero.

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.  |
|--------------------|-------------|-----------------------|-------------|--------|
| D(GDP(-1))         | -0.042123   | 0.086911              | -0.484668   | 0.6611 |
| D(LABOR)           | -0.662043   | 1.198469              | -0.552408   | 0.6192 |
| D(MS)              | -6.53E-07   | 1.41E-06              | -0.463363   | 0.6747 |
| D(EMT)             | 0.105840    | 0.184331              | 0.574183    | 0.6061 |
| D(EMT(-1))         | -0.208943   | 0.363111              | -0.575425   | 0.6053 |
| D(DI)              | -3.21E-07   | 6.64E-07              | -0.483340   | 0.6619 |
| D(FDI)             | 7.08E-05    | 0.000123              | 0.574276    | 0.6060 |
| D(FDI(-1))         | 1.36E-05    | 3.25E-05              | 0.417359    | 0.7045 |
| C                  | 0.289006    | 0.672125              | 0.429987    | 0.6962 |
| RESID(-1)          | 0.831480    | 1.354119              | 0.614038    | 0.5826 |
| RESID(-2)          | -0.737814   | 1.332832              | -0.553569   | 0.6185 |
| R-squared          | 0.115191    | Mean dependent var    | 5.71E-16    |        |
| Adjusted R-squared | -2.834172   | S.D. dependent var    | 0.133742    |        |
| S.E. of regression | 0.261881    | Akaike info criterion | 0.189131    |        |
| Sum squared resid  | 0.205745    | Schwarz criterion     | 0.691248    |        |
| Log likelihood     | 9.676081    | Hannan-Quinn criter.  | 0.142651    |        |
| F-statistic        | 0.039056    | Durbin-Watson stat    | 2.172989    |        |
| Prob(F-statistic)  | 0.999948    |                       |             |        |

## Appendix 6 Long-Term and Short-Term ARDL Test Results

ARDL Long Run Form and Bounds Test  
 Dependent Variable: D(GDP,2)  
 Selected Model: ARDL(1, 0, 0, 1, 0, 1)  
 Case 2: Restricted Constant and No Trend  
 Date: 11/20/24 Time: 12:56  
 Sample: 2008 2023  
 Included observations: 14

| Conditional Error Correction Regression |             |            |             |        |
|-----------------------------------------|-------------|------------|-------------|--------|
| Variable                                | Coefficient | Std. Error | t-Statistic | Prob.  |
| C                                       | 2.268369    | 0.383172   | 5.919978    | 0.0020 |
| D(GDP(-1))*                             | -0.942154   | 0.043582   | -21.61820   | 0.0000 |
| D(LABOR)**                              | 1.414873    | 0.456504   | 3.099369    | 0.0269 |
| D(MS)**                                 | -5.32E-06   | 7.57E-07   | -7.030091   | 0.0009 |
| D(EMT(-1))                              | 1.122454    | 0.062020   | 18.09823    | 0.0000 |
| D(DI)**                                 | -3.90E-09   | 3.38E-07   | -0.011538   | 0.9912 |
| D(FDI(-1))                              | -0.000232   | 4.99E-05   | -4.647155   | 0.0056 |
| D(EMT,2)                                | -1.377312   | 0.054949   | -25.06543   | 0.0000 |
| D(FDI,2)                                | -9.47E-05   | 3.96E-05   | -2.392587   | 0.0622 |

\* p-value incompatible with t-Bounds distribution.  
 \*\* Variable interpreted as  $Z = Z(-1) + D(Z)$ .

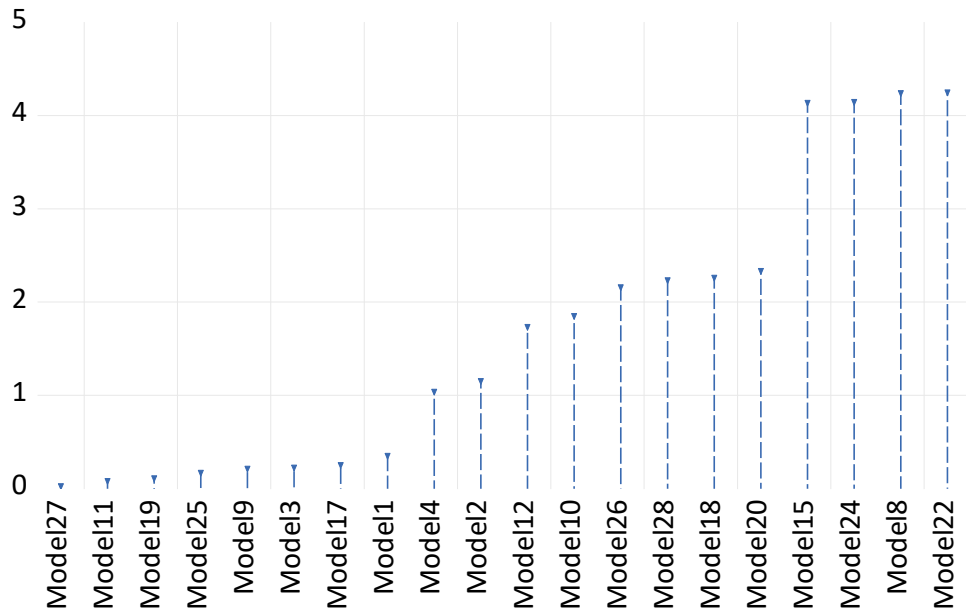
| Levels Equation<br>Case 2: Restricted Constant and No Trend |             |            |             |        |
|-------------------------------------------------------------|-------------|------------|-------------|--------|
| Variable                                                    | Coefficient | Std. Error | t-Statistic | Prob.  |
| D(LABOR)                                                    | 1.501742    | 0.491773   | 3.053728    | 0.0283 |
| D(MS)                                                       | -5.65E-06   | 7.97E-07   | -7.084337   | 0.0009 |
| D(EMT)                                                      | 1.191369    | 0.098928   | 12.04277    | 0.0001 |
| D(DI)                                                       | -4.14E-09   | 3.59E-07   | -0.011539   | 0.9912 |
| D(FDI)                                                      | -0.000246   | 5.93E-05   | -4.156061   | 0.0089 |
| C                                                           | 2.407640    | 0.417944   | 5.760675    | 0.0022 |

EC = D(GDP) - (1.5017\*D(LABOR) -0.0000\*D(MS) + 1.1914\*D(EMT) -0....  
 \*D(DI) -0.0002\*D(FDI) + 2.4076)

| F-Bounds Test      |               | Null Hypothesis: No levels relationship |       |       |
|--------------------|---------------|-----------------------------------------|-------|-------|
| Test Statistic     | Value         | Signif.                                 | I(0)  | I(1)  |
| F-statistic<br>k   | 499.0990<br>5 | Asymptotic: n=1000                      |       |       |
|                    |               | 10%                                     | 2.08  | 3     |
|                    |               | 5%                                      | 2.39  | 3.38  |
|                    |               | 2.5%                                    | 2.7   | 3.73  |
|                    |               | 1%                                      | 3.06  | 4.15  |
| Actual Sample Size | 14            | Finite Sample: n=35                     |       |       |
|                    |               | 10%                                     | 2.331 | 3.417 |
|                    |               | 5%                                      | 2.804 | 4.013 |
|                    |               | 1%                                      | 3.9   | 5.419 |
|                    |               | Finite Sample: n=30                     |       |       |
|                    |               | 10%                                     | 2.407 | 3.517 |
|                    |               | 5%                                      | 2.91  | 4.193 |
|                    |               | 1%                                      | 4.134 | 5.761 |

## Appendix 7 Lag Test Result

### Akaike Information Criteria (top 20 models)



Model27: ARDL(1, 0, 0, 1, 0, 1)  
 Model11: ARDL(1, 1, 0, 1, 0, 1)  
 Model19: ARDL(1, 0, 1, 1, 0, 1)  
 Model25: ARDL(1, 0, 0, 1, 1, 1)  
 Model9: ARDL(1, 1, 0, 1, 1, 1)  
 Model3: ARDL(1, 1, 1, 1, 0, 1)  
 Model17: ARDL(1, 0, 1, 1, 1, 1)  
 Model1: ARDL(1, 1, 1, 1, 1, 1)  
 Model4: ARDL(1, 1, 1, 1, 0, 0)  
 Model2: ARDL(1, 1, 1, 1, 1, 0)  
 Model12: ARDL(1, 1, 0, 1, 0, 0)  
 Model10: ARDL(1, 1, 0, 1, 1, 0)  
 Model26: ARDL(1, 0, 0, 1, 1, 0)  
 Model28: ARDL(1, 0, 0, 1, 0, 0)  
 Model18: ARDL(1, 0, 1, 1, 1, 0)  
 Model20: ARDL(1, 0, 1, 1, 0, 0)  
 Model15: ARDL(1, 1, 0, 0, 0, 1)  
 Model24: ARDL(1, 0, 1, 0, 0, 0)  
 Model8: ARDL(1, 1, 1, 0, 0, 0)  
 Model22: ARDL(1, 0, 1, 0, 1, 0)