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The Role of Economic Digitalization on Economic Performance in Indonesian

ABSTRACT

Economic digitalization has an important role in improving the economic performance of a country. The purpose of this study is to analyze the effect of economic digitalization as measured by internet users, financial technology, electronic money, and electronic commerce on economic performance proxied using Gross Regional Domestic Product (GRDP) with a research focus on 34 Indonesian provinces during the 2019-2022 period. The method used in this study is a panel data regression model with secondary data sourced from BPS, OJK, and BI. So the best model is obtained, namely the Fixed Effect Model. Partially, the results showed that the internet users variable had a positive and significant effect on GRDP, financial technology had a negative and significant effect on GRDP, electronic money and electronic commerce variables had a negative and insignificant effect on GRDP. Simultaneously, the variables of internet users, financial technology, electronic money, and electronic commerce affect GRDP.

Keywords: Gross Regional Domestic Product, Internet Users, Financial Technology, Electronic Money, and Electronic Commerce
JEL Classification: O4, O3, G23, O33, L81

INTRODUCTION

Economic performance refers to the assessment or evaluation of a country's economic conditions within a certain period of time (Delgado et al., 2014; Setiawan & Augustine, 2016). In this case, economic performance can include various aspects that describe the macroeconomic and microeconomic conditions. There are several indicators used in measuring economic performance, namely investment and savings, budget balance, foreign trade, inflation, income and income distribution, unemployment rate, and economic production (output) measured through GDP (Gross Domestic Product) or GRDP (Gross Regional Domestic Product). In this study, economic performance is proxied using GRDP, where GRDP is one of the milestones in boosting economic growth (Oktaviana & Amalia, 2018).

GRDP is an indicator of economic growth, where economic growth is one of the fundamental parameters used to measure success in development in a country, the higher the economic growth of a region indicates the better economic activity obtained from the

growth rate of GDP at constant prices (Todaro & Smith, 2012). Therefore, efforts are needed to achieve an optimal level of economic growth through various economic policies, this is also certainly inseparable from the government and by those authorized to make policies to overcome economic problems (Leasiwal, 2013). Based on data obtained from *Badan Pusat Statistik* (BPS), in 2020 economic growth reached a minus number, which was -2.07%. The COVID-19 pandemic is the culprit behind the decline in Indonesia's economic growth in 2020. The world economy, including Indonesia, has been affected by the increasing number of COVID-19 cases. To stop the spread of the virus that is hampering global economic growth including Indonesia's, a number of countries are implementing lockdown policies (Susilawati et al., 2020). As a result, COVID-19 has created a period of challenge and uncertainty, driving the inevitable acceleration of digital transformation. Today, the main interest is to set our sights on the post COVID-19 future, focusing on how to take advantage of this situation and turn challenges into new opportunities (Almeida et al., 2020). One of the opportunities for the spread of the disease outbreak is the development of economic digitalization.

Based on neo-classical growth theory, the Solow growth model is intended to demonstrate the interactions between the expansion of the labor force, capital stock, and technology in the economy and how these interactions affect the nation's total output of goods and services (Halsmayer & Hoover, 2016; Mankiw, 2010). One form of technological progress or acceleration of digital transformation in Indonesia is the development of internet users. The emergence of internet users represents a facet of innovation stemming from digitalization, this implies that numerous activities take place through virtual platforms, encompassing the generation and sharing of value, transactions, and interactions among established economic participants, utilizing the internet as a medium for these exchanges (Hinings et al., 2018). With the development of internet users

in Indonesia, communication and informatics services are expected to facilitate the community in obtaining information that has an impact on improving their quality of life, and is expected to run optimally and evenly is expected to run optimally and evenly and later have an impact on the growth of GRDP. Findings made by Choi & Yi (2009); Salahuddin & Gow (2015); and Wahab et al. (2020) shows that there is a significant relationship between internet users and GRDP.

In addition, digitalization is also supported by the development of financial technology (fintech) in Indonesia. Fintech is one way to improve the services offered by the financial sector through the development of information technology (Sari et al., 2022). With the development of fintech, consumption, investment and financing activities become easier and faster without being limited by barriers because all financial transactions are carried out based on technology (Sadigov et al., 2020). According to Keynes' Growth Theory, two of the three determinants of economic growth in a closed economic system in a region are increased consumption and investment activities (Terra et al., 2021). Thus, in theory the development of fintech in consumption, investment, or financing activities and other economic activities should increase aggregate income, which in turn can also increase GRDP. Findings conducted by Khiewngamdee & Yan (2019); Narayan (2019); and Song & Appiah-otoo (2022) stated that fintech has a significant impact on GRDP. This is because fintech has the potential to boost GRDP, besides that fintech is able to provide accessibility to the community, so that all Indonesians can more easily reach various financial services through gadgets (Candy et al., 2022).

The rapid development of economic digitalization has penetrated into various sectors of life. Based on the Modern economic growth theory by Kuznets (1973) which states that a country's economic growth is a long-term increase in capacity in the fulfillment of various economic goods

needed by the community, this is due to technological, institutional and ideological advances to the demands of the existing situation. All community needs are increasingly facilitated by electronic payment system services or non-cash payments, often known as e-money. *Bank Indonesia* Regulation Number 20/6/PBI/2018 contains regulations governing electronic money (e-money), the presence of these regulations gives people the freedom to conduct transactions without needing to carry cash or wallets (Arifin & Oktavilia, 2020). The aim of cashless policies is to reduce the negative impacts of the increasing use of cash in the economy, such as high cash risks, inefficiency, and corruption (Adu, 2016). In addition, the advantages of e-money itself can be seen from the nominal amount of money traded and free transaction fees, besides that e-money also has security features that make people feel safe in transacting using e-money (Tee & Ong, 2016). Based on research conducted by Kartika, V. T. & Nugroho (2015) states that e-money has an influence on GRDP. However, these results are inversely proportional to the research conducted by Fitriyani et al. (2023) and Muhammad (2021) research findings indicate state that in the short term e-money has a negative value and does not affect GRDP.

In line with the development of e-money users, it will certainly increase the electronic commerce (e-commerce) business in the community in Indonesia. According to Romer's (1986) endogenous growth theory, endogenous growth includes three fundamental components, namely internal progress in technology achieved through knowledge accumulation, production of consumer goods, and the creation of new ideas by firms driven by scientific progress. With the increasing stock of knowledge and new ideas in the economy, it will encourage the growth of creativity, creation and initiative, and be realized in innovative and productive activities (Wang & Huang, 2018). As is known, one of the innovative and productive activities of the development of digitalization is e-commerce. E-commerce is a term that is widely used in companies, especially for online

buying and selling transactions, in e-commerce all parties are directly involved in buying and selling transactions (Molinillo et al., 2018; Rosiyana et al., 2021). The trend of e-commerce usage in Indonesia is increasing every year (Canover & Kartikasari, 2021; Heliyani et al., 2023). This is because e-commerce platforms are very loved by people in Indonesia, especially the younger generation who like to shop online, but on the other hand e-commerce is one of the clear proofs that technological developments can increase economic productivity which will contribute to GRDP (Nasution, 2019). Based on research conducted by Nursari (2020); Parishev et al. (2020); and Sumahir et al. (2022) stated that e-commerce has an effect on GRDP. While research conducted by Dianari (2018) and Toska & Fetai (2023) states the opposite result, where e-commerce does not have a significant impact on GRDP in the short term, indicating that changes in e-commerce activity in Indonesia do not necessarily affect GRDP.

Based on the description above, this research gap focuses on the independent variable regarding economic digitalization, then this study examines the latest year data, and this study is different from previous studies because it uses the subject of 34 provinces in Indonesia. Therefore, this research is deemed necessary to find out how the contribution of economic digitalization to GRDP, given the gap or condition of economic growth which always increases and decreases every year, which is influenced by factors related to economic digitalization. Based on these problems, this study aims to analyze the effect of digitalization such as internet users, fintech, e-money, and e-commerce on economic performance proxied using GRDP.

RESEARCH METHODS

This research uses quantitative research methods that use numerical data for analysis (Millena & Jesi, 2021). In this study, economic performance proxied using GRDP is used as the dependent variable. While internet users, fintech, e-money, and e-

commerce are used as independent variables. The data used is secondary data obtained through the official website of *Badan Pusat Statistik* (BPS) for economic performance variables proxied using GRDP, internet users, and e-commerce, *Otoritas Jasa Keuangan* (OJK) for fintech variables, and *Bank Indonesia* for e-money variables. The research objects used in this study include 34 provinces in Indonesia for 4 years (2019-2022). Because the data used is a combination of time series and cross-section data, the analysis technique used is panel data regression analysis. So, the model specifications used are as follows:

$$GDRP_{it} = \beta_0 + \beta_1 IU + \beta_2 FT + \beta_3 EM + \beta_4 EC + \varepsilon it \ldots (1)$$

Description:

GRDP = Gross Regional Domestic Product (Million Rupiah)

B_0 = Constanta

$\beta_{1, 2, 3, 4}$ = Coefficient

IU = Internet Users (%)

FT = Financial Technology (Billion Rupiah)

EM = Electronic Money (Million Unit)

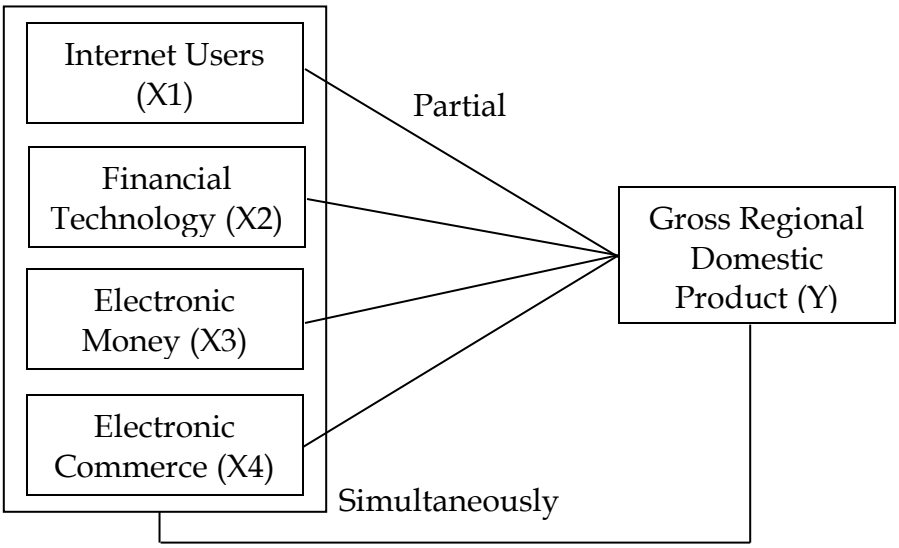
EC = Electronic Commerce (%)

ε = Error Term

i = Cross Section

t = Time Series

Figure 1: Analysis Framework



To estimate the variables of internet users, fintech, e-money, and e-commerce on economic performance proxied using GRDP, using a panel data model with the analytical tool used, namely the EViews 12 application and taking the following steps: 1) conduct the Chow test, Hausman test, and LM-Breusch Pagan test to select the best model of the panel data model; 2) select the best model between the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM); and 3) interpret the final model partially and simultaneously in accordance with the analytical framework of Figure 1.

RESULTS AND DISCUSSION

The discussion in this study is to analyze the impact of independent variables, namely internet users, fintech, e-money, and e-commerce, which will affect the dependent variable, namely economic performance proxied using GRDP, with the research period during 2019-2022. In this research discussion, the first thing to do is to test to determine the best model to determine the appropriate model to use in panel data regression. Furthermore, choosing between three models namely CEM, FEM, and REM.

Table 1: Best Model Test Results

Model Selection Test	Effect Test	Probabilities	Decision
Chow Test	Cross-section Chi-square	0.0000	FEM
Hausman Test	Cross-section random	0.0000	FEM

Source: Processed data output (EViews12)

From the results of table 1 above, it is known that the probability value in the Chow test and Hausman test is 0.0000, where the value is smaller than 0.05 (α = 0.05), so it can be stated that the FEM is the best model to use. Since the Chow Test and Hausman Test both show that the most appropriate test is FEM, there is no need to conduct the LM-Breusch Pagan Test. After obtaining the best panel model, the next estimation will be carried out with the following regression results.

Table 2: Regression Panel Data Fixed Effect Model

Variable	Coefficient	Probabilities	Description
C	12.14134	0.0000	Significant
IU	0.003817	0.0001	Significant
LOG FT	-0.014102	0.0006	Significant
LOG EM	-0.006971	0.1122	InSignificant
EC	-0.000174	0.2058	InSignificant
Adjusted R-squared	0.998855		
Prob(F-statistic)	0.000000		

Source: Processed data output (EViews12)

The following is the regression result equation:

$$\mathrm{GDRP_{it}} = 12.14134 + 0.003817\ \mathrm{IU} - 0.014102\ \mathrm{LOG\ FT} - 0.006971\ \mathrm{LOG\ EM} - 0.000174\ \mathrm{EC} + \varepsilon \mathrm{it} \ldots (2)$$

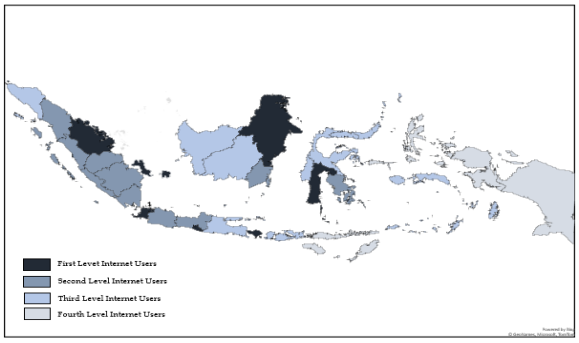
Based on table 2 above, it is known that the partial test (t test) identified by the probability value of the independent variable shows that the variable internet users and fintech has a significant effect on the dependent variable namely GRDP, where the probability value is smaller than alpha 0.05. While the e-money and e-commerce variables have no significant effect on GRDP, where the probability value obtained is greater than alpha 0.05.

The panel data regression model research in Table 2, shows that simultaneously (F-test), which is obtained from the Prob (F-statistic) value of 0.0000, where the value is smaller than 0.05. This shows that the variables of internet users, fintech, e-money, and e-commerce have a simultaneous influence on GRDP. In addition, the Adjusted R-Squared value generated is 0.998855. This means that the variables of internet users, fintech, e-money, and e-commerce are able to explain changes in GRDP variables by 99.89%, while the remaining 0.11% can be attributed to other variables outside the model.

This study found that internet users have a positive and significant relationship with GRDP. This is indicated by the coefficient value of the internet users variable, which is 0.003817, and a significance value of 0.0001 < alpha 0.05. This result means that every 1 percent increase in the number of internet users will increase the level of GRDP by 0.0038 percent, assuming other variables are constant. This result is consistent with existing theory, because as internet users increase, people can become more proficient in recognizing other factors of production and contribute more to the overall increase in output, when a country's output increases, this can also increase the level of aggregate supply that drives the growth of GRDP. In addition, the findings are in line with some previous researchers such as Choi & Yi (2009); Salahuddin & Gow (2015); and Wahab et al. (2020) which shows that there is a significant relationship between internet users and GRDP. This

is because with the development of internet users, the country is able to increase productivity capacity in the economic sector and build relationships with the global economy to ensure competitiveness (Sassi & Goaied, 2013). The more internet users in Indonesia, the more people can disseminate and obtain information quickly, stimulate innovation, build networks, create businesses, obtain capital, tighten market competition, obtain labor, and benefit companies to gain profits with the aim of increasing GRDP.

Figure 2: Data on the Distribution of Internet Users in Indonesia



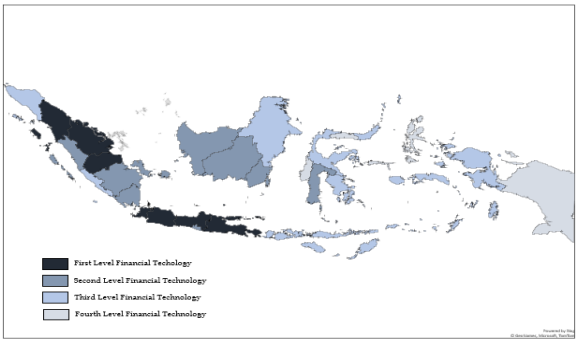
Source: BPS (Data Processed)

Based on Figure 2, it shows the distribution of Internet Users in 34 provinces in Indonesia, where there are four levels in the distribution of Internet Users in Indonesia. The first level shows the province that has the highest data on the distribution of Internet Users, the second level shows the province that has the second highest data, the third level also shows the province that has the third highest data, and the fourth level is data that shows the province that has the lowest level of distribution of Internet Users. DKI Jakarta is the province that has the highest level of distribution of Internet Users in Indonesia, while Papua is the province that has the lowest level of distribution of Internet Users in Indonesia.

This study found that fintech has a negative and significant relationship with GRDP. This is indicated by the coefficient value of the fintech variable, which is -0.014102, and a significance value of 0.0006 < alpha 0.05. This result means that every 1 percent increase in the fintech variable will reduce the level of GRDP by 0.014 percent, assuming other variables are constant. This result is in accordance with existing theory, where the development of fintech in consumption, investment, or financing

activities and other economic activities, aggregate income will increase which in turn will also increase GRDP. The results of the study align with those of some earlier researchers by Khiewngamdee & Yan (2019); Narayan (2019); and Song & Appiah-otoo (2022) which states that fintech has an influence on GRDP. This is because with the advancement of economic digitalization, especially fintech, if utilized properly by the community, it will undoubtedly provide excellent opportunities for GRDP growth. These opportunities can be in the form of simpler payment or transfer procedures, more useful alternative investment options, and simpler access to fintech services available through devices or computers (Purwanto et al., 2022). In this finding, fintech has a negative value which means the opposite direction, this is due to the existence of complex problems such as the potential misuse of customer funds and fraudulent activities under the guise of investment or loans and high dependence on the internet can exacerbate these problems.

Figure 3: Financial Technology Distribution Data in Indonesia

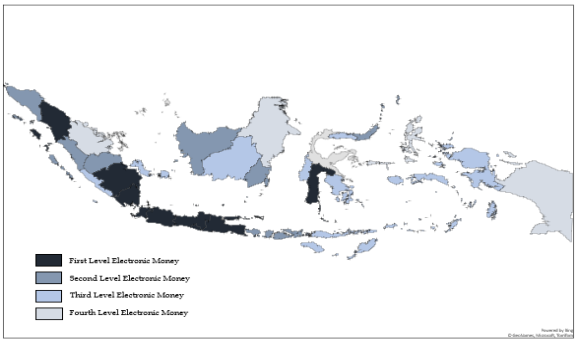


Source: OJK (Data Processed)

Based on Figure 3, shows the distribution of fintech in 34 provinces in Indonesia, where there are four levels in the distribution of fintech in Indonesia. The first level shows the province that has the highest data on fintech distribution, the second level shows the province that has the second highest data, the third level also shows the province that has the third highest data, and the fourth level is data that shows the province that has the lowest level of fintech distribution. Where DKI Jakarta is the province that has the highest level of fintech distribution in Indonesia, while North Maluku is the province that has the lowest level of fintech distribution in Indonesia.

This study found that e-money has a negative and insignificant relationship with GRDP. This is indicated by the coefficient value of the variable number of internet users, which is -0.006971, and a significance value of 0.1122 > alpha 0.05. This result means that every 1 percent increase in the e-money variable will reduce the level of GRDP by 0.0070 percent, assuming other variables are constant. The results of this study are not in accordance with existing theory, where the higher the technological progress, in the long run, the increased capacity in the fulfillment of various economic goods will be fulfilled, if the needs of the community are met, it will have a contribution to GRDP. However, the findings are in line with several previous researchers such as Fitriyani et al. (2023) and Muhammad (2021) which explains that e-money cannot affect GRDP in the short term, this is because the distribution of e-money is still uneven and only reaches city centers. Therefore, the development of e-money has not been able to contribute optimally to GRDP. In addition, in this finding e-money has a negative value, which means that it is in the opposite direction, this is due to a shift in public deposits in banks in the form of savings and deposits into a form of float which is a liability on the balance sheet of commercial banks. This transfer of funds occurs in non-bank institutions, so the use of e-money will only encourage the circulation of money, but cannot increase GRDP.

Figure 4: E-Money Distribution Data in Indonesia



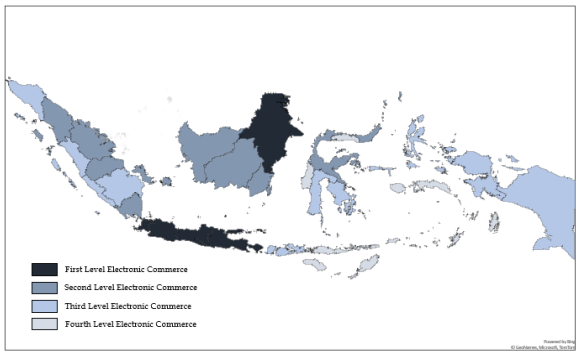
Source: *Bank Indonesia* (Data Processed)

Based on Figure 4, shows the distribution of e-money in 34 provinces in Indonesia, where there are four levels in the distribution of e-money in Indonesia. The first level shows the province that has the highest data on e-money distribution, the second level shows the province that has the second

highest data, the third level also shows the province that has the third highest data, and the fourth level is data that shows the province that has the lowest level of e-money distribution. Where DKI Jakarta is the province that has the highest level of e-money distribution in Indonesia, while North Kalimantan is the province that has the lowest level of e-money distribution in Indonesia.

This study found that e-commerce has a negative and insignificant relationship with GRDP. This is indicated by the coefficient value of the e-commerce variable, which is -0.000174, and a significance value of 0.2058 > alpha 0.05. This result means that every 1 percent increase in the e-commerce variable will reduce the level of GRDP by 0.0002 percent, assuming other variables are constant. This finding is not in line with existing theory, where e-commerce development is one of the relevant GRDP growth factors in the modern era. However, the findings are in line with several previous researchers such as Dinari (2018) and Toska & Fetai (2023) which claims that e-commerce has no appreciable impact on GDRP, this is because e-commerce hasn't penetrated rural areas, so its growth hasn't had a major effect on the economy. Despite its huge growth potential, the e-commerce industry in Indonesia is still unevenly developed and has yet to have a major impact on GRDP. In addition, in this finding e-commerce has a negative value, which means that it is in the opposite direction, this is because e-commerce in Indonesia is still surrounded by the issue of cybercrime, especially fraud, thus affecting consumer confidence not to make transactions on online market places such as e-commerce.

Figure 5: E-Commerce Distribution Data in Indonesia



Source: BPS (Data Processed)

Based on Figure 5, it shows the distribution of e-commerce in 34 provinces in Indonesia, where there are four levels in the distribution of e-commerce in Indonesia. The first level shows the province that has the highest data on e-commerce distribution, the second level shows the province that has the second highest data, the third level also shows the province that has the third highest data, and the fourth level is data that shows the province that has the lowest level of e-commerce distribution. Where DKI Jakarta is the province that has the highest level of e-commerce business distribution in Indonesia, while West Sulawesi is the province that has the lowest level of e-commerce business distribution in Indonesia.

CONCLUSIONS

The results showed that partially internet users have a positive and significant impact on GRDP, fintech has a negative and significant impact on GRDP, e-money has a negative and insignificant impact on GRDP, and e-commerce has a negative and insignificant impact on GRDP. While simultaneously the economic digitalization variables in this study include internet users, fintech, e-money, and e-commerce together have an influence on GRDP.

The development of economic digitalization in the current era of modernization can trigger the emergence of various dangers such as cybercrime. Therefore, to avoid the rise of cybercrime due to the development of digitalization, the government and stakeholders are expected to issue policies regarding the development of economic digitalization in Indonesia in order to avoid cybercrime. Economic digitalization needs to be socialized more actively by the government and related authorities, especially for people in regions whose mobility levels are not as much as in big cities. In addition, there is a need for policies regarding security in digital payment systems, this is so that transactions carried out do not harm users. And the government is expected to improve policies related to e-commerce in order to increase

production value and open up business opportunities in various sectors. So that the policies issued by stakeholders on the development of economic digitalization are expected to contribute to economic performance.

Although this study discusses the determinants of economic digitalization on economic performance proxied using GRDP, this study has several limitations. There are many factors that can describe the development of economic digitalization, but this study only uses several factors that describe the development of economic digitalization in Indonesia. Therefore, for future research, researchers recommend expanding the scope of research by including more objects, research periods, and components that affect economic performance and digitalization using different methods.

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