

THE IMPACT OF CASHLESS PAYMENT ON ECONOMIC GROWTH IN INDONESIA

Ari Christianti^{*)}¹

^{*)}Faculty of Business, Duta Wacana Christian University
Jl. dr. Wahidin Sudirohusodo, No.5-25, Yogyakarta 55224, Indonesia

Abstract: The development of digitization in payments has begun to replace cash payments with cashless payments. This study examines the effect of cashless payments on economic growth in Indonesia using quarterly data from 2010 to 2021. Economic growth in this study is proxied by gross domestic product, and cashless payments are proxied by transaction values from ATMs/debit cards, credit cards, and electronic money. The quantitative analysis method used in this research is time series with Error Correction Modeling (ECM). One of the benefits of ECM is that this model can be used to see the effect of economic variables in the short and long term. The study results show that cashless payments do not affect economic growth in the short term. However, in the long run, cashless payments in the form of ATM/debit and electronic money positively affect Indonesia's economic growth, even though these results have remained consistent during the Covid-19 pandemic. The results of this study indicate that in the short term, cashless will not directly affect economic growth. This finding may be because cashless payments require time (in the long term) in the equitable availability of infrastructure development, digital ecosystems, and the process of public financial literacy, so it takes time for cashless to impact economic growth.

Keywords: ATMs/debit cards, credit cards, economic growth, electronic money, Error Correction Modeling (ECM)

Abstrak: Perkembangan digitalisasi dalam pembayaran sudah mulai menggantikan pembayaran tunai dengan pembayaran non-tunai. Penelitian ini bertujuan untuk menguji pengaruh pembayaran nontunai terhadap pertumbuhan ekonomi di Indonesia dengan menggunakan data triwulanan dari tahun 2010 hingga 2021. Pertumbuhan ekonomi dalam penelitian ini diprosikan dengan produk domestik bruto, dan pembayaran nontunai diprosikan dengan nilai transaksi dari ATM/Debit, kartu kredit, dan uang elektronik. Metode analisis kuantitatif yang digunakan dalam penelitian ini adalah time series dengan Error Correction Modeling (ECM). Salah satu manfaat ECM adalah model ini dapat digunakan untuk melihat pengaruh antara variabel ekonomi dalam jangka pendek maupun jangka panjang. Hasil penelitian menunjukkan bahwa pembayaran nontunai tidak berpengaruh terhadap pertumbuhan ekonomi dalam jangka pendek. Namun, dalam jangka panjang, pembayaran non tunai berupa ATM/Debit dan uang elektronik berpengaruh positif terhadap pertumbuhan ekonomi Indonesia bahkan hasil ini tetap konsisten pada masa pandemi Covid-19. Hasil penelitian ini menunjukkan bahwa dalam jangka pendek cashless tidak akan langsung mempengaruhi pertumbuhan ekonomi. Temuan ini mungkin disebabkan karena pembayaran non tunai membutuhkan waktu (jangka panjang) dalam proses ketersediaan pemerataan pembangunan infrastruktur, ekosistem digital, dan proses literasi keuangan masyarakat sehingga dibutuhkan waktu bagi cashless untuk bisa berpengaruh terhadap pertumbuhan ekonomi.

Kata kunci: ATM/ Debit, kartu kredit, pertumbuhan ekonomi, uang elektronik, Error Correction Modeling (ECM),

Article history:

Received
27 September 2023

Revised
27 November 2023

Accepted
9 December 2023

Available online
31 January 2024

This is an open access article under the CC BY license (<https://creativecommons.org/licenses/by/4.0/>)



¹ Alamat Korespondensi:
Email: ari@staff.ukdw.ac.id

INTRODUCTION

The development of cashless payments in Indonesia continues to increase, especially in the digitalization era; cash payments have evolved into cashless payments. Payment technology has transformed the existing payment scheme system along with current developments in digital technology (Situmorang et al. 2023). Cashless payments are developing because they provide convenience (Jebarajakirthy & Shankar, 2021), efficiency (Kaur et al. 2020), and cost-effectiveness (Mukhopadhyay, 2016). Cashless payments in progress consist of payment with credit transfers, cheques, direct debit (Tee & Ong, 2016), credit cards (Shy, 2020) electronic money (Rahman et al. 2020), billing cards, and electronic wallets (Teng & Khong, 2021; Alam et al. 2021). The following is a table of developments in the value of cashless transactions in Indonesia consisting of ATM/Debit, credit cards, and electronic money.

Based on Table 1, electronic money is the fastest growing compared to using ATM/Debit and credit cards. Even the value of electronic money transactions in 2019 exceeded that of credit card transactions. The emergence of the e-wallet marks the development of electronic money in Indonesia. Examples of current electronic money are ShopeePay, LinkAja, i.saku, OVO, GoPay, Uangku, Brizzi (BRI), mandiri e-money, JakOne (Bank DKI), and Flazz (BCA). It means that people have started to feel the benefits of cashless, and even later, cashless can become a necessity. Furthermore, ATM/Debit is still widespread and continues to increase. In total, the growth in the value of cashless transactions (ATM/Debit, Credit Cards, and

Electronic Money) increased on average by 13.38% every 4th quarter.

The transformation from a cash economy to a cashless economy benefits the economy significantly. Because cashless payments could create transparency and accountability and reduce fraud due to using cash, which is an essential element in economic growth (Mieseigha & Ogbodo, 2013). This statement has supported by research that found that cashless payments positively affect economic growth (Oyewole et al. 2013; Tee & Ong, 2016; Zandi et al. 2013; Zandi et al. 2015). Moreover, three transmission channels could describe the positive effect of cashless payments on economic growth (Wong et al. 2020) consist; of, first is the consumption channel. (Zandi et al. 2013) argue that cashless payments can provide consumers with direct credit, making purchasing goods and services more accessible. Furthermore, this will increase private consumption and contribute to higher economic growth. The second is the investment channel. Hasan et al. (2012) stated in their research that cashless payments reduce costs associated with paper document-based transactions, leading to lower operating costs and economies of scale among businesses and investors. Investment channels will lead to business expansion and a more significant economic investment, contributing to economic growth. The third is channels of government expenditure. Schneider (2013) states that cashless payments facilitate tax collection by the government. Therefore, cashless payments can improve the government's fiscal balance so that more revenue can use for pro-growth policies and economic growth.

Table 1. The development of cashless transaction value in Indonesia (in billion rupiahs)

Year	ATM/Debit	Credit Cards	Electronic Money	Total
Des-10	195,897	15,992	64	211,953
Des-11	238,807	17,003	125	255,934
Des-12	287,840	18,557	246	306,643
Des-13	358,385	21,241	568	380,194
Des-14	418,872	25,490	729	445,090
Des-15	464,104	26,577	1,414	492,096
Des-16	522,911	26,371	1,766	551,048
Des-17	574,510	27,228	5,896	607,634
Des-18	650,181	30,229	12,139	692,549
Des-19	653,319	32,830	40,586	726,735
Des-20	674,310	21,192	57,937	753,439
Des-21	724,592	25,919	79,807	830,317

Source: Payment System and Financial Market Infrastructure Statistics or PSFMS (*Statistik Sistem Pembayaran dan Infrastruktur Pasar Keuangan* or SPIP), April 2022

Research on financial innovation, namely cashless payments, has yet to be widely studied (Mustapha, 2018). Existing studies still focus on European Union countries (Bolt et al. 2008; Hasan et al. 2012; Tee & Ong, 2016; Mustapha, 2018), high-income countries (Zandi et al. 2013; Zandi et al. 2015), and Nigeria (Oyewole et al. 2013). In addition, there are differences in the effect of types of cashless payments on increasing economic growth. Zandi et al. (2013) investigated the economic impact of using electronic cards (credit and debit cards) in 56 high-income countries from 2008 to 2012. The results concluded that using electronic cards increased private consumption by 0.7% and subsequently led to increased growth in GDP of 0.17% per year. Furthermore, Prabheesh & Eki Rahman, (2019) found that credit cards have a consumption-smoothing effect in Indonesia. Narayan (2020) studied and proved the influence of fintech on Indonesia's economic growth. Juhro & Iyke (2019) also support Narayan (2020) regarding the positive impact of fintech on Indonesia's economic growth.

Next, Oyewole et al. (2013) examined Nigeria's cashless payments and economic growth. The results of their research show that there is a negative relationship between cheque payments and real GDP per capita in Nigeria. It means the high transaction costs of cheque payments in developing countries outweigh the benefits of cheque payments on economic growth. In contrast, Oyewole et al. (2013) found that adopting electronic payments (debit and credit cards) boosted trade and economic development in Nigeria. Tee & Ong (2016), who researched 5 European countries, found that implementing one type of cashless payment will affect other types in the short term. However, for a long time, economic growth has been impacted by non-cash payment instruments (card payments, electronic money, cheque prices, and telegraphic transfers).

Based on the explanation before, research on cashless payments on economic growth is rarely conducted in developing countries and only focuses on European Union and high-income countries. In addition, there are still differences in the effects of types of cashless payments on economic growth. Thus, this study aims to obtain empirical evidence about the impact of cashless (ATM/Debit, Credit Cards, and Electronic Money) on economic growth in Indonesia.

METHODS

The data used in this study is secondary data in the form of quarterly time series (time series data) from 2010 to 2021 (12 years = 48 quarters). The economic growth proxied with Gross Domestic Product on the Central Bureau of Statistics or CBS (*Biro Pusat Statistik* or BPS) website, and cashless proxied with total value transactions from ATM/Debit, Credit Card, and Electronic Money. They obtain from the Bank of Indonesia website, in *Statistik Sistem Pembayaran dan Infrastruktur Pasar Keuangan* (SPIP).

Furthermore, the quantitative analytical method used in this study is the Error Correction Mechanism (ECM). ECM analysis in this study was processed using E-views software. Data processing is carried out in stages, starting with collecting and classifying quarterly data and then transforming the data into natural logarithms. Next, perform data processing beginning with the unit root test, degree of integration test, cointegration test, and ECM.

ECM continues the cointegration test, which aims to correct deviations from the long-term equilibrium. In ECM, the short-term dynamic relationship between variables in the system is affected by deviations from the long-run equilibrium (Enders, 2014). If the observed variables form a set of variables that cointegrate with each other, the model that is suitable for finding short-term equilibrium is the ECM model. Furthermore, the ECM model will be valid if the cointegrated variables get supported by statistically significant ECT (Error Correction Term). The hypothesis of this research:

H1a: The value of ATM/Debit transactions positively affects economic growth.

H1b: Credit card transaction value positively affects economic growth.

H1c: The value of electronic money transactions has a positive effect on economic growth.

Wong et al. (2020) explained that cashless could increase economic growth through 3 transmission channels, namely the consumption channel, investment channel, and government expenditure channel. Based on Figure 1, payments without cash will impact providing direct credit to consumers, thereby increasing purchasing power and spending for purchasing goods and services (Zandi et al. 2013; Zandi et al. 2015). Furthermore, cashless payments facilitate business operating costs, leading to economies of scale and economic growth

(Bolt et al. 2008). Finally, cashless payments enable the collection of taxes by the government (Immordino & Russo, 2018; and Wisniewski et al. 2021), and therefore more income from tax revenues can be used to stimulate economic growth. Thus, cashless payments increase consumption, investment, and government spending and promote economic growth.

Based on the previous explanation, research on non-cash payments on economic growth is rarely carried out in developing countries. It only focuses on European Union countries, high-income countries, and Nigeria. Apart from that, there are still differences in results regarding the influence of types of non-cash payments on economic growth. Based on Figure 2, this research will examine the influence of non-cash payments consisting of payment instruments using cards (ATM/Debit and Credit Cards) and Electronic Money (E-Money) on economic growth in Indonesia. If non-cash payments are proven to stimulate economic growth, then this research will identify which cashless payments will produce growth-enhancing effects for Indonesia. Likewise, if cashless payments reduce economic growth, then this research will identify which type of cashless payment is responsible for the decline in economic growth rates in Indonesia. It is important to guide policymakers regarding non-cash payments.

Because of the advantages of ECM in combining short-term and long-term effects, ECM becomes a model that can explain explanatory variables well. The ECM equation in this study is:

$$DLnGDPT = a + b1DLnNT_ATMDebt + b2DLnNT_CCt + b3DLnNT_EMt + ECTt-1 + et$$

Information: DLnGDP (First difference from Ln GDP at constant price); DLnNT_ATMDeb (First difference from Ln ATM and debit transaction values); DLnNT_CC (First difference from Ln credit card transaction value); DLnNT_EM (First difference from Ln value of electronic money transactions); ECT (Error Correction Term).

According to Gujarati & Porter (2008), the ECM model shows enormous use in empirical economics because the model makes economic theory dynamic by explicitly considering the role of time. The ECM model can distinguish the dependent variable's short-term and long-term response to a unit change in the value of the explaining variable.

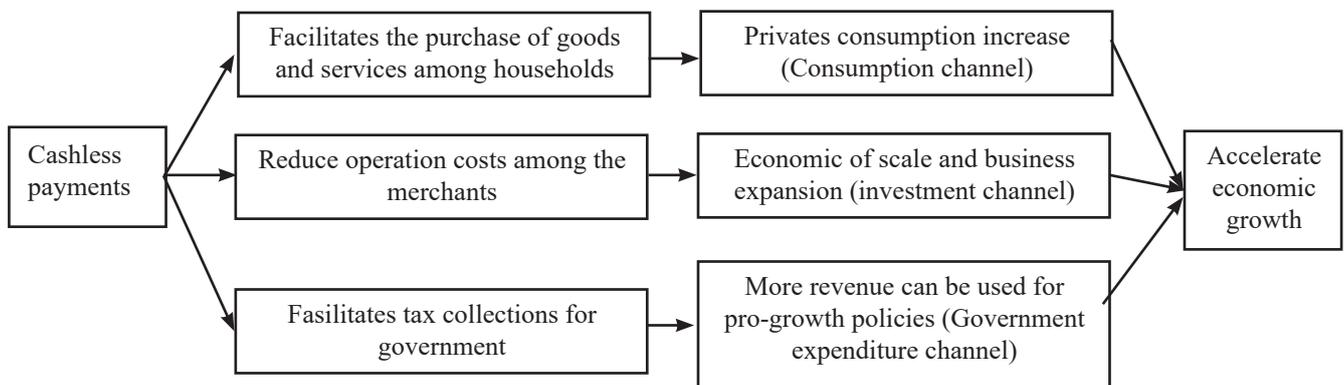


Figure 1. Non-cash payment transmission channel on economic growth (Wong et al. 2020)

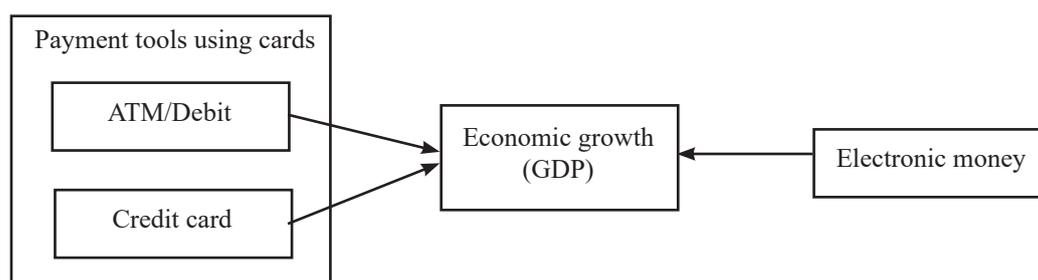


Figure 2. Research framework

RESULTS

The Development of Economic Growth in Indonesia

The following is a graph that describes the development of Indonesia's GDP (Gross Domestic Product) during 2010-2021. Figure 3 shows that economic growth decreased during the Covid-19 pandemic. However, the policies taken by the government, especially during the Covid-19 period, have been good enough in controlling economic growth so that there is some period the economy is experiencing growth.

Cashless Development in Indonesia

The following will explain the development of cashless payments in Indonesia, which consists of payments using ATM/Debit, credit cards, and electronic money:

Development of ATM/Debit Transaction Values as Payment Instrument

The graph below describes the development of the value of ATM/Debit transactions in Indonesia during 2010-2021. Figure 4 shows that the development of the value of payment transactions using ATM/Debit in Indonesia from 2010:1 to 2021:4 is experiencing a growth trend. Although the value of ATM/Debit transactions

experienced a significant decline in 2020:2, which was 18.92% from 2020:1 (110,893.2 billion rupiahs), it increased again in 2020:3 by 19.95% from 2020: 2 (94,802.1 billion rupiahs). The decrease and increase in the value of ATM/Debit transactions during 2020 may be due to government policies related to Large-scale social restrictions or LSSR (*Pembatasan Sosial Berskala Besar* or PSBB) in early April 2020 and the New Normal era in June 2020. Payment transactions with ATM/Debit can continue to grow during the transformation of society and companies to cashless payments.

The Development of the Use of Credit Cards as a Payment Instrument

The following figure describes the development of credit card transaction values in Indonesia during 2010-2021. Figure 5 shows the development of credit card transaction values in Indonesia from 2010:1 to 2021:4. Along with the entry of the Covid-19 pandemic in early March 2020, the result of credit card use in 2020:2 experienced a very sharp decline, namely from 24,158.17 billion rupiahs in 2020:1 to 17,101.80 billion rupiahs in 2020:2 or decreased by 29.21%. This decline is likely because the use of credit cards has shifted with the development of fintech lending, crowdfunding, and e-commerce, which also offer credit.

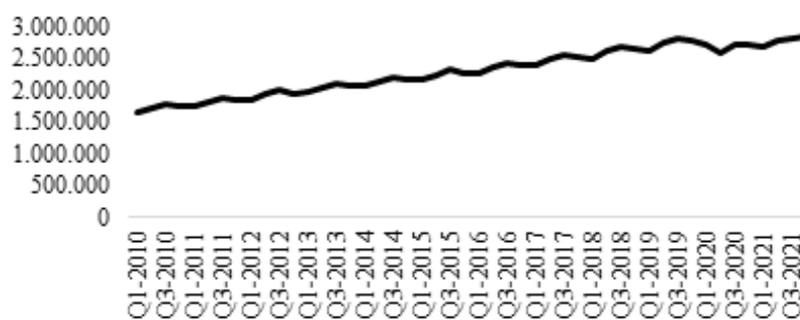


Figure 3. GDP for 2010-2021 (in billion rupiahs)

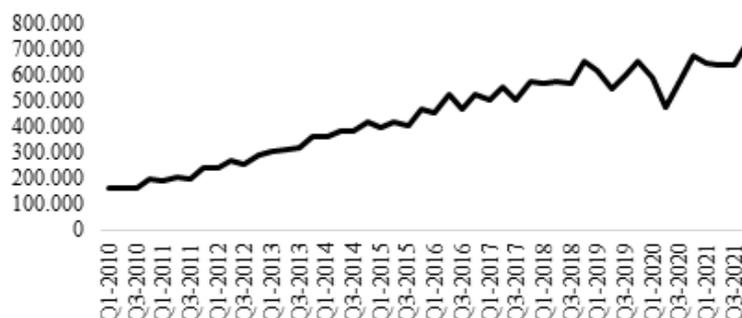


Figure 4. Value of ATM/Debit transactions 2010-2021 (in billion rupiahs)

The Development of the Use of Electronic Money as a Payment Instrument

The following will explain the development of the value of electronic money transactions in Indonesia during 2010-2021. Figure 6 shows the increase in the use of electronic money experienced a very significant increase from 2019:1 to 2021:4, with a rise of 162.03% (30,457.11 billion rupiahs in 2019:1 to 79,806.53 billion rupiahs in 2021:4). The increase in the use of electronic money influenced by the Covid-19 Pandemic which began to enter Indonesia since early March 2020. The Covid-19 pandemic encouraged people to make payments electronically to avoid the risk of virus transmission and the emergence of government policies regarding social restrictions (Wisniewski et al. 2021).

Unit Root Test (Stationary Test)

One test that tests the stationary data is the ADF test (Thomas, 1997). If the absolute value of the ADF statistic is greater than the critical value, then the observed data is stationary and vice versa. If the ADF test shows that the data level is not stationary, then the difference in non-stationary processes is carried out by testing the degree of integration. Below are the

results of the stationary test of each research variable at the data level. Based on Table 2, the results of the unit-roots test on data level or degree 0 or $I[0]$ with alpha 1%, 5%, and 10%, it shows that the variables LnGDP, LnNT_ATMDeb, LNNT_CC, and LnNT_EM are individually non-stationary. Therefore, there is a possibility that the regression is pseudo or spurious (Gujarati & Porter, 2008). Furthermore, the integration test will determine to what degree the observed data will become stationary.

Integration Degree Test

The integration test is due to the non-fulfillment of the stationary assumption at zero degrees $I(0)$. The following are the results of the integration degree test of the GDP and cashless variables. Based on Table 3 shows that after the degree of integration test was carried out in $I[1]$, it turned out that all the variables measured were stationary. So, the variables LnGDP, LnNT_ATMDeb, LnNT_CC, and LnNT_EM integrate at the first difference level or $I[1]$. Furthermore, to strengthen the results of the above test, a residual stationarity test (ECT: Error Correction Term) was also carried out using the ADF approach from the basic estimation equation.

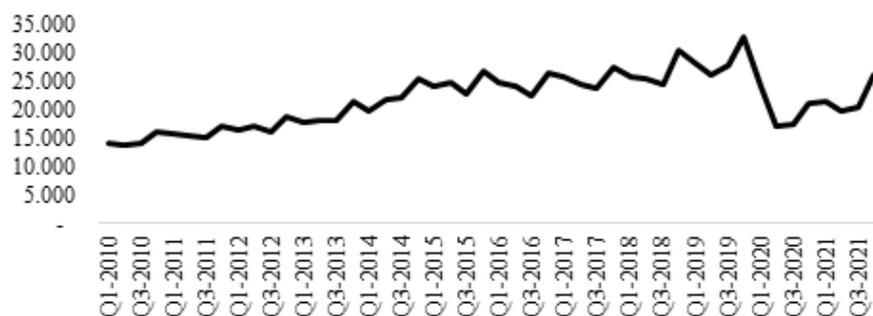


Figure 5. Credit card transaction value 2010-2021(in billion rupiahs)



Figure 6. Value of electronic money transactions 2010-2021

Table 2. Stationary test results on level data

Variable	ADF test statistic	Test critical values			Prob.	Information
		1% level	5% level	10% level		
LnGDP	-1.220772	-3.581152	-2.926622	-2.601424	0.6576	non-stationary
LnNT_ATMDeb	-2.011258	-3.581152	-2.926622	-2.601424	0.2812	non-stationary
LnNT_CC	-2.268564	-3.581152	-2.926622	-2.601424	0.1862	non-stationary
LnNT_EM	-0.097580	-3.581152	-2.926622	-2.601424	0.9435	non-stationary

Table 3. The results of the first difference integration degree test

Variables	ADF test statistic	Test critical values			Prob.*	Information
		1% level	5% level	10% level		
LnPDB	-11.86605	-3.584743	-2.928142	-2.602225	0.0000	stationary
LnNT_ATMDeb	-6.635836	-3.584743	-2.928142	-2.602225	0.0000	stationary
LnNT_CC	-6.400199	-3.584743	-2.928142	-2.602225	0.0000	stationary
LnNT_EM	-5.602071	-3.584743	-2.928142	-2.602225	0.0000	stationary

Cointegration Test

A cointegration test is a form of examination in a dynamic model. This test aims to determine whether there is a long-term relationship between the observed variables. First, to perform the cointegration test, regress the dependent variable with the independent variable using the OLS method to obtain the residual value, referred to as the Error Correction Term (ECT). As it can be seen in the Table 4, the variables are said to be cointegrated; if there is a linear combination between the variables that are not stationary, then the residual of the linear combination (ECT) must be stationary.

Table 5 shows that the results of the stationary test for residuals (ECT) indicate that the ECT is stationary at I(0). That is, the variables LnGDP, LnNT_ATMDeb, LnNT_CC, and LnNT_EM are a set of variables that are cointegrated. Thus, there may be a long-term balance between cashless (using ATM/Debit, Credit Cards, and Electronic Money as payment) and GDP, so ECM tests did. Remember that Cointegration is a condition for forming ECM (Gujarati & Porter, 2008).

ECM (Error Correction Mechanism)

ECM is used to see the regression equation's short-term behavior by estimating the Error Correction Term (ECT) dynamics. The following table is the result of the ECM test. Based on Table 6, the Error Correction Term (ECT) coefficient value is -0.58 is significant at 1% alpha. The magnitude of the cointegration coefficient indicates the speed of error correction to correct the behavior of each variable in the short term to get to a

new equilibrium (long-term equilibrium). ECT shows how quickly equilibrium is reached back into long-term stability (Gujarati & Porter, 2008).

The Effect of the Covid-19 Pandemic Period

This study uses the 2010:1 to 2021:4 research period, which contains the Covid-19 pandemic period. The previous explanation shows that electronic money has developed significantly compared to ATM/Debit and credit cards. Electronic money grew along with the entry of the digitalization era. Government policies limited the community's social activities during the Covid-19 pandemic, which caused people to start using electronic money to conduct financial transactions.

The existence of the period of the Covid-19 pandemic in the study could affect the relationship between cashless and economic growth. On the one hand, social restrictions have accelerated the digitization of financial transactions. Still, on the other hand, the Covid-19 pandemic has caused economic activity in many goods and service industries to decline. Therefore, this study will test a Dummy variable and a dynamic model for the Covid-19 period. Value of 1 for the Covid-19 period (2020:1 to 2021:4) and 0 otherwise. The first case of Covid-19 entering Indonesia occurred on March 2, 2020, while the Covid-19 virus was discovered first in Wuhan, China, at the end of December 2019. Thus the estimation equation becomes:

$$DLnPDB_t = a + b_1DLnNT_ATMDeb_t + b_2DLnNT_CC_t + b_3DLnNT_EM_t + Dummy_t + e_t$$

Table 4. Regression estimation results

Variables	Coefficient	Std. Error	t-statistic	Prob.
C	12.05865	0.294385	40.96217	0.0000
LnNT_ATMDeb	0.157866	0.045087	3.501369	0.0011
LnNT_CC	0.025323	0.043476	0.582472	0.5632
LnNT_EM	0.037968	0.006129	6.195028	0.0000

Table 5. ECT stationary test results

Variable	ADF test statistic	Test critical values			Prob.*	Information
		1% level	5% level	10% level		
ECT	-6.792348	-3.581152	-2.926622	-2.601424	0.0000	stationary

Table 6. ECM estimation results

Variables	Coefficient	Std. Error	t-statistic	Prob.
C	0.011528	0.003938	2.927193	0.0055
DLnNT_ATMDeb	0.038761	0.063423	0.611147	0.5444
DLnNT_CC	0.014773	0.048789	0.302794	0.7635
DLnNT_EM	-0.007252	0.014823	-0.489236	0.6272
ECTt-1	-0.576361	0.142511	-4.044340	0.0002

Just as in the previous stage of dynamic analysis, data on the Dummy will be carried out unit root test (stationary test), and the following are the results. From the Table 7, LnNT_ATMDeb, LnNT_CC, and Ln_EM variables are not stationary at the data level or I(0) but only at I(1). Furthermore, a cointegration test will be carried out by first regressing to get the residual value or ECT. Furthermore, after getting the ECT value from the regression results in Table 8, the ECT stationary test is carried out on the data level.

Table 9 shows the stationary residuals (ECT) test results from the estimation equation (2). It indicates that the ECT is stationary at I(0). Therefore, LnPDB, LnNT_ATMDeb, LnNT_CC, LnNT_EM, and Dummy variables are a set of variables that are cointegrated.

Based on the cointegration test shows that there is cointegration between the variables in the study. The table below is a comparison table of the results of hypothesis testing. As shown in Table 10, the estimation results of model 1 and model 3 are the long-term estimation results, while the estimation results of model 2 are the short-term estimation results. The analysis of model 3 considers the period of the Covid-19 Pandemic in Indonesia with a dummy variable. The estimation results of models 1 and 3 both produce coefficients of the variable value of ATM/Debit and electronic money transactions which are positive and

statistically significant. The variable value of ATM/Debit transactions in the long term affects increasing economic growth (GDP). Similarly, the increase in Electronic Money transactions over a long time also affects the increase in economic growth (GDP).

Furthermore, the Dummy variable in estimation model 3 shows a negative and statistically significant coefficient. There is a significant difference between economic growth during the Covid-19 period and before the Covid-19 period. The negative coefficient indicates that economic growth before the Covid-19 period was better than economic growth during the Covid-19 period. Then, based on estimation, model 2 shows that all cashless variables (ATM/Debit, credit cards, and electronic money) are not statistically significant in the short term. In the short term, the transaction value of ATM/Debit, credit cards, and electronic money does not affect increasing economic growth. However, increasing the value of ATM/Debit and electronic money transactions over time can impact economic growth. The results of this study support Hypothesis 1a and Hypothesis 1c and do not support Hypothesis 1b. Cashless can boost economic growth only for cashless ATM/Debit and electronic money. These results support previous research that states that cashless is positively related to economic growth (Hasan et al. 2012; Oyewole et al. 2013; Zandi et al. 2013; and Wong et al. 2020).

Table 7. Unit root test results and degree of first difference integration

Variables	ADF test statistic	Test critical values			Prob.	Information
		1% level	5% level	10% level		
Unit root test						
Dummy	-0.388429	-3.581152	-2.926622	-2.601424	0.9025	non-stationary
Degree of first difference integration						
Dummy	-4.743416	-3.584743	-2.928142	-2.602225	0.0004	stationary

Table 8. Regression estimation results

Variables	Coefficient	Std. Error	t-statistic	Prob.
C	12.66862	0.377510	33.55835	0.0000
LnNT_ATMDeb	0.184100	0.044188	4.166302	0.0001
LnNT_CC	-0.074937	0.058680	-1.277051	0.2084
LnNT_EM	0.045856	0.006681	6.863313	0.0000
Dummy	-0.057952	0.024100	-2.404622	0.0206

Table 9. ECT stationary test results

Variable	ADF test statistic	Test critical values			Prob.*	Information
		1% level	5% level	10% level		
ECT	-6.607783	-3.581152	-2.926622	-2.601424	0.0000	stationary

Table 10. Comparison of hypothesis testing results

Variables	Model 1	Model 2	Model 3
C	12.05865***	0.011528***	12.66862***
LnNT_ATMDEb	0.157866***		0.184100***
LnNT_CC	0.025323		-0.074937
LnNT_EM	0.037968***		0.045856***
DLnNT_ATMDEb		0.038761	
DLnNT_CC		0.014773	
DLnNT_EM		-0.007252	
ECT(-1)		-0.576361***	
Dummy			-0.057952**

Description: * sig. at alpha 10%; ** sig. at alpha 5%; *** sig. at alpha 1%.

The use of ATM/Debit is still growing and continues to grow. In its development, payment transactions with ATM/Debit can continue to grow while transforming society and companies into digital finance. Furthermore, the Covid-19 pandemic increased electronic money, which entered Indonesia in early March 2020, encouraging people to make payments electronically due to the risk of virus transmission and the emergence of government policies regarding social restrictions. Credit Cards in this study do not affect increasing economic growth in the short and long term. These results do not support the research of Prabheesh & Eki Rahman (2019), which states that credit cards have a consumption-smoothing effect in Indonesia that

can increase economic growth. More research explores on this credit card is needed. People with access to banking may still need to improve using credit cards. Alternatively, compared to credit cards, electronic money like pay later is easier and faster to provide credit to the public (such as SPayLater from Shopee, Kredivo, and Gopaylater).

Overall, cashless positively affect economic growth in the long term. The cashless policy will only affect economic growth after some time. This finding may be due to the effect of cashless on economic growth requiring time for equitable distribution of infrastructure development and the process of public

financial literacy regarding cashless payments. Isah & Babalola (2019) stated that financial literacy supported by adequate and safe infrastructure facilities could increase public confidence in cashless transactions.

Therefore, the development of cashless payments, especially electronic money, must be supported by adequate digital infrastructure and ecosystem. Infrastructure and digital ecosystems that guarantee public safety in conducting digital financial transactions are very important. In addition, financial literacy in general and the inclusion of growing and varied financial products must be able to reduce public losses due to fraud. People must have qualified and intelligent financial literacy in making every investment decision so they are not trapped in the shackles of illegal online loans or fraudulent investments. Thus, good public financial literacy can increase economic growth if advances in digital finance can accelerate the achievement of a cashless society.

Managerial Implication

In the long term, electronic money has positively affected economic growth. Therefore, the government must continue supporting the increase in electronic money transactions to develop digital infrastructure and ecosystems. The government must also be able to guarantee system security, data security, and funds so that people feel comfortable and calm in using electronic money, which continues to grow in the digitalization era. Moreover, the public must also have qualified and intelligent financial literacy in making every investment decision.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study examines the effect of cashless payments (ATM/Debit, credit cards, and electronic money) on economic growth in Indonesia. ECM is used to test the research purpose because this model can see the relationship between the independent and dependent variables in the short and long term. The study results show that cashless payments (ATM/Debit, credit cards, and electronic money) do not affect economic growth in the short term. However, in the long term, cashless payments (ATM/debit and electronic money) positively affect economic growth.

The next analysis uses the same estimation model to test the effect of cashless payments (ATM/Debit, credit cards, and electronic money) on economic growth in Indonesia during the Covid-19 pandemic. The results are consistent with previous results, namely that in the long run, there is a positive effect between cashless payments (ATM/Debit and electronic money) on economic growth. Even during the Covid-19 pandemic, the use of cashless payments increased along with the government's policy of implementing social restrictions. However, the effect of cashless payments on economic growth will still take time and will not have an immediate effect in the short term.

Therefore, cashless payments can increase economic growth because (1) Cashless payments in terms of direct credit to consumers can increase the purchasing power of goods and services. It means that cashless payments can increase spending on the consumption of goods and services, increasing the income of business people. (2) Cashless payments facilitate business operating costs, leading to economies of scale and economic growth. Cashless payments can increase operational efficiency and reduce company operational costs. (3). Allows for greater tax collection by the government. Because the system will immediately record payments, there is no data manipulation, and tax revenue obtained from payment transactions will be maximized.

Recommendations

The weakness of the research for future research is that this research only discusses cashless, which consists of ATM/Debit, credit cards, and electronic money. However, the study did not include paper-based payments (cheque and bilyet giro). At the same time, paper-based is also a form of cashless payment. For this reason, further research can add paper-based payments as a cashless proxy apart from ATM/Debit, credit cards, and electronic money.

REFERENCES

- Alam MM, Awawdeh AE, Muhamad AI. 2021. Using e-wallet for business process development: challenges and prospects in Malaysia. *Business Process Management Journal* 27(4):1142–1162. <https://doi.org/10.1108/BPMJ-11-2020-0528>
- Bolt W, Humphrey DB, Uittenbogaard R. 2008. Transaction pricing and the adoption of

- electronic payments: A cross-country comparison. *International Journal of Central Banking* 4:89–123.
- Enders W. 2014. *Applied Econometric Time Series* (4th edition). New York: Wiley.
- Gujarati DN, Porter DC. 2008. *Basic Econometrics* (5th edition). New York: McGraw Hill Inc.
- Hasan I, De Renzis T, Schmiedel H. 2012. Retail payments and economic Growth. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2100651>
- Immordino G, Russo FF. 2018. Cashless payments and tax evasion. *European Journal of Political Economy* 55:36–43. <https://doi.org/10.1016/j.ejpoleco.2017.11.001>
- Isah HA, Babalola A. 2019. Impact of cashless economic policy and financial inclusiveness in Nigeria: An empirical investigation. *Amity Journal of Economics* 4(2):47–61.
- Jebarajakirthy C, Shankar A. 2021. Impact of online convenience on mobile banking adoption intention: A moderated mediation approach. *Journal of Retailing and Consumer Services* 58:1-12. <https://doi.org/10.1016/j.jretconser.2020.102323>
- Juhro SM, Iyke BN. 2019. Monetary policy and financial conditions in indonesia. *Buletin Ekonomi Moneter Dan Perbankan* 21(3):283–302. <https://doi.org/10.21098/BEMP.V21I3.1005>
- Kaur P, Dhir A, Bodhi R, Singh T, Almotairi M. 2020. Why do people use and recommend m-wallets? *Journal of Retailing and Consumer Services* 56:1-11. <https://doi.org/10.1016/j.jretconser.2020.102091>
- Mieseigha EG, Ogbodo UK. 2013. An empirical analysis of the benefits of cashless economy on Nigeria's economic development. *Research Journal of Finance and Accounting* 4(17):11–16. <https://core.ac.uk/reader/234629696>
- Mukhopadhyay B. 2016. Understanding cashless payments in India. *Financial Innovation* 2(1):1–26. <https://doi.org/10.1186/s40854-016-0047-4>
- Mustapha SA. 2018. E-Payment technology effect on bank performance in emerging economies-evidence from Nigeria. *Journal of Open Innovation: Technology, Market, and Complexity* 4(4):1–14. <https://doi.org/10.3390/joitmc4040043>
- Narayan SW. 2020. Does fintech matter for Indonesia's economic growth? *Buletin Ekonomi Moneter Dan Perbankan* 22(4): 437–456. <https://doi.org/10.21098/bemp.v22i4.1237>
- Oyewole OS, El-Maude, Gambo J, Abba M, Onuh ME. 2013. Electronic payment system and economic growth: A review of transition to cashless economy in Nigeria tax incentives and FDI in Nigeria view project socio-political factors influencing Covid-19 response in West Africa view project. *International Journal of Scientific Engineering and Technology* 918(2):913–918.
- Prabheesh KP, Eki RR. 2019. Monetary policy transmission and credit cards: Evidence from Indonesia. *Buletin Ekonomi Moneter Dan Perbankan* 22(2):137–162. <https://doi.org/10.21098/bemp.v22i2.1039>
- Rahman M, Ismail I, Bahri S. 2020. Analysing consumer adoption of cashless payment in Malaysia. *Digital Business* 1(1):1-11. <https://doi.org/10.1016/j.digbus.2021.100004>
- Schneider F. 2013. The shadow economy in Europe, 2013. *AT Kearny Study* 1–24. https://feelingeurope.eu/Pages/Shadow_Economy_in_Europe.pdf.
- Shy O. 2020. Low-income consumers and payment choice. *Research in Economics* 74(4): 292–300. <https://doi.org/10.1016/j.rie.2020.09.001>
- Tee HH, Ong HB. 2016. Cashless payment and economic growth. *Financial Innovation* 2(1):1–9. <https://doi.org/10.1186/s40854-016-0023-z>
- Teng S, Khong KW. 2021. Examining actual consumer usage of E-wallet: A case study of big data analytics. *Computers in Human Behavior* 121:1-18. <https://doi.org/10.1016/j.chb.2021.106778>
- Thomas RL. 1997. *Modern Econometrics: An Introduction*. Harlow: Addison-Wesley Longman Ltd.
- Wisniewski TP, Polasik M, Kotkowski R, Moro A. 2021. Switching from cash to cashless payments during the COVID-19 pandemic and beyond. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3794790>
- Wong TL, Lau WY, Yip TM. 2020. Cashless payments and economic growth: Evidence from selected OECD countries. *Journal of Central Banking Theory and Practice* 9:189–213. <https://doi.org/10.2478/jcbtp-2020-0028>
- Zandi M, Koropecjy S, Singh V, Matsiras P. 2015. The impact of electronic payments on economic growth table of contents. *Moody's Analytics* 31.
- Zandi M, Singh V, Irving J. 2013. The impact of income inequality on economic growth. *Moody's Analytics* February:59–100. <https://doi.org/10.1787/9789264235120-5-en>