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THE INFLUENCE OF NON-CASH PAYMENT TRANSACTIONS ON ECONOMIC GROWTH IN 5 ASEAN COUNTRIES

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ABSTRACT

Technological advances are currently proliferating; financial technology is no exception. The development of financial technology has led to changes in payment system innovation from a cash payment system to a non-cash payment system. This research aims to determine how non-cash payment transactions influence the economic growth of five ASEAN countries. The economic growth variable in this study is calculated through the growth of real GDP published by the World Bank (WDI). The variable of non-cash payments in this study is assumed to be through the growth of the transaction value of debit cards, credit cards, e-money, and cheques issued by the Bank International of Settlement (BIS). This study utilizes secondary data in panel data, cross-section data (5 ASEAN countries), and time series data (2012 – 2019). The analysis is carried out using the panel data regression method. This research found that the growth in the value of non-cash payment transactions in the form of debit cards and e-money has proven to encourage economic growth in these countries. Meanwhile, credit card and cheque payments had no impact on economic growth. This is because debit cards provide direct access to consumers' funds, making it easier for the public to consume goods and contributing to economic growth. E-money, an electronic payment instrument, has offered benefits as an alternative payment, particularly for micro and retail purchases. Through the use of e-money, the government's income can increase from the increasing number of customers who have used e-money payments, which can encourage economic growth.

Keywords: *Non-Cash Payment Instruments, Economic Growth, Debit Cards, Credit Cards, E-Money, Cheque, ASEAN*

JEL: F43; C30; C23

Introduction

In recent years, non-cash payments have become widely used and proven effective for transactions. Non-cash payments are efficient in several countries because they eliminate distance barriers between regions and time processes where users can cheque, transfer, or consume via digital accounts anytime and anywhere. The most crucial factor is that the development of non-cash payments makes it possible to reduce the costs of circulating money to produce more significant economic profits (Chen et al., 2019).

In particular, non-cash payments can positively impact economic growth through three transmission channels (Wong et al., 2020). First, the consumer channels proposed by Zandi et al. (2013) state that non-cash payments offer customers direct credit, allowing them

to purchase goods and services, resulting in more public consumption and faster economic growth. Second, the investment channel, where non-cash payments reduce the costs of circulating cash, will impact greater levels of investment in the economy (Hasan et al., 2012). Third, the government expenditure channel by Kearney & Schneider (2011) states that non-cash payments facilitate tax collection, increasing the government's fiscal balance and income that can be used for government policy, which will impact economic growth.

Numerous studies have been carried out on the effect of non-cash payments on economic growth in various countries. However, more research needs to be conducted on how non-cash payments affect the economic growth of ASEAN countries. Previous research has only examined European Union countries (Bolt et al., 2008; Hasan et al., 2012; Tee & Ong, 2016; Mustapha, 2018), high-income countries (Zandi et al., 2016), and Nigeria (Oyewole et al., 2013). Because each country has a distinct economic structure and technological innovation level, research results from these countries may not be applicable to ASEAN countries.

Based on this explanation, it is necessary to conduct a study to determine how non-cash payments affect the economic growth of ASEAN countries. This study intends to answer the issue of whether non-cash payment instruments (debit cards, credit cards, e-money, and checks) can boost growth in ASEAN nations. Previous studies conducted research in European countries and OECD countries, but this research was conducted in ASEAN countries. So, this can be used as a research gap.

Literature Review

Economic Growth

Economic growth is a quantitative indicator that depicts a country's economic development within one year compared to the previous year. It is also considered one of the conditions to support the economic development process (Meiner, 2006). Economic growth indicators can be calculated and analyzed over an annual period. This seeks to analyze the policies made by the government which aim to encourage economic activity more effectively.

According to Blanchard (2011), economic growth is measured using a region's Gross Domestic Product (GDP). Economic growth also describes an economy that impacts society's increasing prosperity and development over time. The level of economic growth is measured using the following method:

$$\Delta Gt = \frac{\Delta GDPt - \Delta GDPt - 1}{\Delta GDPt - 1} \times 100\% \tag{1}$$

Where :

ΔGt : economic growth rate in period t
GDPt : GDP at constant prices, in period t
GDP (t-1): GDP at constant prices, in the previous year's period

Theory of Velocity of Money

The velocity of money is the speed at which currency moves from wallet to wallet (Mankiw, 2012). To calculate the velocity of money according to Mankiw (2012) is as follows:

$$V = \frac{P \times Y}{M} \tag{2}$$

or,

$$V = \frac{no\min al\ GDP}{money\ \sup ply} \tag{3}$$

Information:

V   = Velocity of money

P   = Price level (GDP deflator)

Y   = Total output (real GDP)

M   = money supply

You can also use the Irving-Fisher Theory formula as follows:

$$MV = PT \qquad (4)$$

That can be,

$$V = \frac{P \times T}{M} \qquad (5)$$

Where:

M   = Money supply

V   = Velocity of money

P   = Price level, (Consumer Price Index (CPI) or GDP deflator)

T   = The quantity of products and services generated in the economy during a specific period, usually one year.

The Role of Payment Systems in the Economy

The development of the way a person carries out transactions using cash over time has become less efficient and less practical. This happens when the nominal value is significant, and the parties carrying out the transaction are far away or in different places. Therefore, non-cash payment instruments are seen as one solution to various problems in using cash payments.

The aim of having a payment system in a country's economy is to encourage national economic growth, support the intermediation function of financial institutions effectively and efficiently, and function as a driver for a faster flow of funds through more varied payment system services. For the national economy, the payment system is expected to support increased economic activity through the competitiveness or image of a country and a creative business environment so that it can encourage foreign investors to enter the country (Warjiyo & Solikin, 2003).

Non-cash payments can improve a country's economy and welfare through several channels, including:

1. Consumer channels. With non-cash payments, consumers can get direct credit, making it easier to purchase goods and services. As a result, public consumption and economic growth will increase (Zandi et al., 2013).
2. Investment channels. Non-cash payments can reduce the cost of cash circulation, resulting in increased investment in the economy (Hasan et al., 2012).
3. Government expenditure channels. Non-cash payments make it easier for the government to collect taxes. Therefore, non-cash payments can increase the government's fiscal balance and revenues that can be used for government policy, thus impacting economic growth (Kearney & Schneider, 2011).

Data and Research Methods

Data

This study utilizes secondary data from 5 ASEAN countries (Malaysia, Indonesia, Singapore, Thailand, and Vietnam) from 2012 to 2019. Table 1 displays the data utilized in this study:

Table 1: Data Types and Sources

Variables	Description	Measuring Unit	Sources
Dependent Variable			
GDP	Real GDP growth rate.	%, Yearly	WDI
Independent Variables			
Debit Card	Growth in the value of debit card transactions.	%, Yearly	BI, BNM, BOT, BIS, The State Bank of Vietnam
Credit Card	Growth in the value of credit card transactions.	%, Yearly	BI, BNM, BOT, BIS, The State Bank of Vietnam
E-money	Growth in the value of e-money transactions.	%, Yearly	BI, BNM, BOT, BIS, The State Bank of Vietnam
Cheque	Growth in cheque transaction value.	%, Yearly	BI, BNM, BOT, BIS, The State Bank of Vietnam

Research methods

This study utilizes a quantitative approach using the STATA 14 application as an analysis tool. The panel data regression method is applied in this study to determine the relation between the dependent variable and the independent variable (Gujarati, 2012).

The empirical model design for this research was adopted from Wong et al., (2020) with modified variables as follows:

$$GDP_t = \beta_0 + \beta_1 Debit_{it} + \beta_2 Credit_{it} + \beta_3 Emoney_{it} + \beta_4 Cheque_{it} + \varepsilon t \qquad (6)$$

Information:

GDP   : Growth in Gross Domestic Product value in each country, in percent (%)
Debit   : Growth in the value of Debit Card transactions in each country, in percent (%)
Credit : Growth in the value of Credit Card transactions in each country, in percent (%)
E-money : Growth in the value of E-money transactions in each country, in percent (%)
Cheques : Growth in the value of Cheque transactions in each country, in percent (%)

The descriptive analysis approach is applied in this research as an analysis technique. Three models can be utilized in panel data regression, namely pooled least square (PLS), fixed effect model (FEM), and random effect model (REM). Among the three models, the best model is selected through several tests as follows:

1) Chow Test

To compare which is better between pooled least square (PLS) and fixed effect model (FEM), it is necessary to apply the Chow test. The hypothesis in the Chow test is as follows:

H0: Pooled Least Square (PLS)
H1: Fixed Effect Model

H0 is rejected if the probability result is more minor than α = 0.05. The fixed effect model is, therefore, the most suitable. Conversely, if H0 is accepted, then the model chosen is PLS. However, if the FEM model is selected, the FEM model must be retested compared to the REM model, then the model is analyzed again so that it can produce a more appropriate model (Gujarati, 2012).

2) Hausman Test

To select the most appropriate model between the fixed effect model and random effect model, the Hausman test is applied with the hypothesis:

H0: Random Effect Model
H1: Fixed Effect Model

H0 is accepted when the probability result is more significant than α = 0.05, so the selected model is the random effects model. H0 is rejected if the probability value is smaller than 0.05. Thus, the fixed effect model is selected (Gujarati, 2012).

3) Lagrange Multiplier Test

To choose the best model between the pooled least square model and the random effect model, the lagrange multiplier test is applied with the hypothesis:

H0: Pooled Least Square
H1: Random Effect Model

H0 is accepted if the probability result is more significant than α=0.05, so the model chosen is pooled least square. conversely, h0 is rejected if the probability value is less than 0.05, indicating that the random effect model is considered the best (Gujarati, 2012).

After choosing the suitable model, the next stage is the Goodness of Fit test.

1. Simultaneous Significance Test (F Test)

The F test is applied to analyze the relationship between independent variables and dependent variables simultaneously with the following hypothesis:

H0: $\beta_1 = \beta_2 = 0$, no significant effect
H1: $\beta_1 \neq \beta_2 \neq 0$, significant effect

H0 is rejected if F statistics > F table indicates that the independent variable significantly influences the dependent variable (Gujarati, 2004).

2. Partial Significance Test (t-Test)

The t-test is applied to analyze how much influence the independent variable has on the dependent variable (Gujarati, 2004). The hypothesis in this test is:

H0: $\beta_1 = 0$, no significant effect

H1: $\beta_2 \neq 0$, significant effect

H0 is rejected if t-statistic > t-table, meaning that the independent variable significantly affects the dependent variable.

Moreover, probability values can also be used as an additional tool to determine the relation between dependent and independent variables. H0 is accepted if the probability value ≥ α = 0.05, indicating that the independent variable does not affect the dependent variable. Conversely, H0 is rejected if the probability value ≤ α = 0.05, so the independent variable significantly influences the dependent variable.

3. Coefficient of Determination (R^2)

The coefficient of determination (R2) measures how much the independent variable can interpret the dependent variable. The R^2 value is expressed as $0 < R^2 < 1$, meaning that if the value is less than 1, the model is said to be getting better (Gujarati, 2004).

Furthermore, if the model chosen is pooled least square (PLS) or fixed effect model (FEM), then the classic assumption test needs to be applied.

1) Normality Test

To find out whether the confounding variables or residuals in the regression model are normally distributed or not, a normality test is applied to the hypothesis:

H0: Data is not normally distributed
H1: Data is usually distributed

H0 is rejected if the t-statistic is less than 0.05, indicating that the data is usually distributed. However, H0 is accepted if the t-statistic is more significant than 0.05, showing that the data is not normally distributed.

2) Multicollinearity Test

To find out whether there is a linear relationship between several explanatory variables in the regression model, it is necessary to carry out a multicollinearity test using tolerance (TOL) and variance inflation factor (VIF) (Gujarati, 2010). The greater the VIF value of variable X, this indicates that the data contains multicollinearity. If the VIF result of a variable is more than 10, it means there is a problem with the variable, or multicollinearity has occurred.

3) Heteroscedasticity Test

The method for detecting whether there is heteroscedasticity in the data is to use the white test. The hypothesis used is as follows:

H0: There is no heteroscedasticity problem
H1: There is a heteroscedasticity problem

If the white test has been carried out, but the final results still contain heteroscedasticity, then it is mandatory to make improvements. The solution to this problem is to use the Weighted Least Squares Method (WLS).

4) Autocorrelation Test

The Autocorrelation Test functions to see how the correlation between members is observed and sorted based on time (for example, time series data). The Durbin-Watson test detects autocorrelation in panel data by comparing the Durbin-Watson test values to the Durbin-Watson Table values to determine whether there is a positive or negative correlation (Gujarati, 2010). Apart from the Durbin-Watson test, another method can be used, namely the LM Breusch-Godfrey test. This test can be used by entering various lag lengths of the dependent variable with the independent variable.

Finding and Discussion

Descriptive Statistics Variables

Descriptive Statistics variable functions as a basis for describing the observation results of each variable. The statistical description of the variables is as follows:

Table 2: Descriptive Statistics Variables

Variables	Obs.	Mean	Std. Dev	Min	Max
Gdp	40	4.71975	1.517431	0.73	7.24
Debit	40	3.6815	2.173915	0.1	9.65
Credit	40	3.1675	1.925794	0.36	9.43

Variables	Obs.	Mean	Std. Dev	Min	Max
emoney	40	3.38	1.611061	1.05	7.84
Cheque	40	3.10825	2.628469	0.02	6.80

The table shows that the average value of the GDP (Gross et al.) variable is 4.71975, and the standard deviation value is 1.517431. This implies that economic growth in the 5 ASEAN countries has a value of 4.7% of total GDP growth. The lowest value obtained from the GDP variable was 0.73%, while the highest was obtained at 7.24%. Of all the non-cash payment variables, the highest value is found in the debit variable, which is 9.65%. This implies that the growth in the value of debit card transactions is the highest among others. Then, the lowest value is in the cheque variable, which is 0.02%. This means that the transaction growth value is the smallest among the other variables.

Estimation Results and Proving Hypothesis

Selection of the Best Model

1) *Chow Test*

The Chow test results are shown in Table 3.

Table 3: Chow Test Results

$F_{(4, 26)}$	1.93
Prob > F	0.1362

Given that the probability value of the Chow test is 0.1362 > 0.05, pooled least square (PLS) is the chosen model.

2) *Hausman Test*

The Hausman test results are shown in Table 4.

Table 4: Hausman Test Results

chi2(4)	1.07
Prob > chi2	0.8986

Given that the probability value of the Hausman test is 0.8986 > 0.05, the random effect model (REM) is the chosen model.

3) *Lagrange Multiplier Test*

Table 5 displays the Lagrange multiplier test results.

Table 5: Lagrange Multiplier Test Results

chibar2(01)	0.00
Prob > chibar2	1.0000

According to the Lagrange multiplier test results, the probability value is 1.0000 > 0.05; hence, pooled least squares (PLS) is the model chosen. The conclusion obtained from the three tests that have been carried out is that the pooled least square (PLS) model is better than the fixed effect model (FEM) and random effect model (REM).

PLS Model Estimation Results

This study examines the relation between independent variables (debit cards, credit cards, e-money, and checks) and the dependent variable (GDP) in five ASEAN countries from 2012 to 2019 using a panel data regression analysis method.

Table 6: PLS Model Estimation Results

Variables	Coef.	St.Err	t	P>| t |
Cons	4.660108	0.6619542	7.04	0.000
Debit	0.7586979	0.2377379	3.19	0.003
Credit	-0.0042271	0.1627233	-0.03	0.979
Emoney	-0.9145779	0.2884015	-3.17	0.003
Cheque	0.1194109	0.0930144	1.28	0.208
R-Squared			0.2538	
Adj-squared			0.1685	
Prob (F-Statistic)			0.0324	

Statistic test

1) Statistical T-Test

From Table 6, it is possible to infer that the probability value for the t-statistical test of the debit and e-money variables is less than alpha 0.05. This shows that the debit and e-money variables significantly affect the GDP variable. Then, the t-test value on the credit and cheque variables is more than alpha 0.05. This indicates that the credit and check variables do not significantly influence the GDP variable.

2) Statistical F-Test

The PLS estimation results in Table 6 show that the probability of the F-statistic is 0.0324. Because the probability value is 0.0324 < 0.05, which indicates that H0 is rejected, the conclusion from the F test results is that the independent variable simultaneously influences the dependent variable. The GDP variable significantly influences the debit, credit, e-money, and check variables.

Classic Assumption Test

1) Multicollinearity Test

Table 7: Multicollinearity Test Results

Variables	VIF	1/VIF
debit	4.30	0.232813
emoney	3.60	0.277960
credit	3.34	0.299068
cheque	1.91	0.523309
Mean VIF	3.29	

According to Table 7, all variables have a VIF value of less than 10, indicating no multicollinearity in the model utilized in this study.

2) Autocorrelation Test

Table 8: Autocorrelation Test Results

F (1, 4)	1.817
Prob > F	0.2489

The autocorrelation test in Table 8 above reveals that the Prob > F value is 0.2489, which means that the model in this study does not have autocorrelation because the probability value is greater than 0.05.

3) Heteroscedasticity Test

Table 9: Heteroscedasticity Test Results

chi2(1)	0.05
Prob > chi2(1)	0.8305

According to the heteroscedasticity test value in Table 9, the Prob > chi2 value is 0.8305, indicating that the model in this study does not have heteroscedasticity because the probability value is more than 0.05.

Robustness Test

Table 10: Robustness Test Results

Variables	Coef.	Std. Error	t	P>| t	
Cons	-0.6115785	3.260951	-0.19	0.852
Debit	0.6870585	0.2583459	2.66	0.012
Credit	0.0222848	0.1398642	0.16	0.874
Emoney	-0.8684942	0.3771212	-2.30	0.028
Cheque	0.0810325	0.1493995	0.54	0.592
Inflation	0.2554684	0.1269542	2.01	0.053
Population	-0.0151696	0.5684165	-0.03	0.979
Openness	0.0183004	0.0069075	2.65	0.013
FDI	-0.2119792	0.0875826	-2.42	0.022
GCF	0.1227102	0.0961431	1.28	0.212
R-Squared			0.5539	
Adj-squared			0.4200	
Prob (F-Statistic)			0.0015	

Table 10 shows that after adding several supporting variables such as inflation, openness, FDI, and GCF, the robustness test value still shows results similar to the first regression test, and this does not affect the change in the significance level of the main variables. The debit card and e-money variables still significantly influence economic growth. In contrast, the credit card and check variables do not significantly influence economic growth. The debit, credit, e-money, and cheque variables have a high level of resilience.

Interpretation of Results and Discussion

$$GDP = 4.6601 + 0.7586 Debit - 0.0042 Credit - 0.9145 Emoney + 0.1194 Cheque + \varepsilon t \qquad (7)$$

First, debit cards directly affect economic growth as measured through GDP with a coefficient value of 0.7586. Assuming other factors remain constant, this implies that a one-unit increase in debit cards would result in a 75.8% increase in GDP. Second, credit cards have an insignificant negative influence on economic growth directly, with a coefficient value of -0.0042. Third, E-money directly negatively influences economic growth (GDP) with a coefficient value of -0.9145. Assuming all other factors remain constant, this indicates that an increase of one unit in the number of e-money users will result in a -91.4% reduction in GDP. Finally, cheques have an insignificant positive influence on economic growth (GDP), with a coefficient of 0.1194.

The research results show that the debit variable influences GDP significantly. This is because the funds on the debit card come from the customer's savings. Therefore, debit card

users will not cause debt accumulation. Debit cards also provide direct access to consumers' funds, making it easier for people to consume goods and contributing to economic growth. This is consistent with studies by Hasan et al. (2012) and Zandi et al. (2016), which show that payments with debit cards can boost economic activity, leading to higher economic growth.

Then, the credit and cheque variable does not affect economic growth in ASEAN. Credit cards do not influence economic growth due to the positive and negative impacts of using credit cards. The positive impact of payments using credit cards, as researched by Zandi et al. (2016), is that credit cards can provide direct credit to consumers so that consumer purchasing power and aggregate economic demand increase. Meanwhile, credit cards negatively impact debt accumulation, which will ultimately lead to high default rates and impact economic growth (Kang & Ma, 2009).

Following is payment using checks. Hasan et al. (2012) found a positive relationship between European economic payments and checks. However, in ASEAN countries, this does not impact economic growth. This is due to the substitution effect between payments using debit cards and checks (Hasan et al., 2012). Thus, consumers prefer payments using debit cards rather than using cheques because of their advantages in convenience and lower transaction costs. As a result, this will reduce cheque use so that the role of check use in driving economic growth will decrease.

Furthermore, the e-money variable significantly influences economic growth in ASEAN countries. This is due to the government's and society's awareness to encourage the use of e-money. E-money, an electronic payment tool, provides benefits as an alternative payment, especially micro and retail payments. This is consistent with research from Hidayati et al. (2006), which states that e-money can increase people's income because transaction costs are cheaper when using e-money, and the time used is more efficient. Through the use of e-money, government income can increase from the increasing number of customers who use e-money payments, encouraging economic growth.

Conclusion

Based on research findings, it is possible to infer that the debit card variable significantly influences economic growth. Furthermore, e-money has a significant negative relationship with economic growth. Lastly, credit card and check variables do not affect economic growth. With these results, the author provides several suggestions. The first is a suggestion aimed at the government to incentivize the central bank to implement non-cash payments in Indonesia. Second, the central bank needs to give authority to other banks so that they can implement the non-cash payment system wisely. Then the advice for the public is to be more careful in using non-cash payments in order to maintain security when making transactions.

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