



THE EFFECT OF ELECTRONIC MONEY TRANSACTIONS ON HOUSEHOLD CONSUMPTION

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ABSTRACT

This study aims to determine the effect of the volume of electronic money transactions on household consumption in Indonesia, Malaysia, Thailand, and Singapore from 2012 to 2019. The seemingly unrelated regression method was chosen due to heteroscedasticity and contemporaneous correlation problems in the model. This method estimates the relationship between the volume of electronic money transactions and household consumption. In this study, electronic money is used in the form of chips and servers. The results of this study indicate that Indonesia, Malaysia, Thailand, and Singapore have a significant positive relationship between the volume of electronic money transactions and household consumption. It indicates that consumers already have confidence in the non-cash payment transaction system, especially electronic money, and feel that using it is more efficient, fast, and secure.

Keywords: *The Volume of Electronic Money, Household Consumption, Seemingly Unrelated Regression*

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ABSTRAK

Penelitian ini bertujuan untuk mengetahui pengaruh volume transaksi uang elektronik terhadap konsumsi rumah tangga di Indonesia, Malaysia, Thailand, dan Singapura pada tahun 2012-2019. Pemilihan metode Seemingly Unrelated Regression (SUR) karena terdapat masalah heteroskedastisitas dan korelasi kesebayaan dalam model sehingga metode ini digunakan untuk mengestimasi pengaruh volume transaksi uang elektronik terhadap konsumsi rumah tangga. Uang elektronik dalam penelitian ini menggunakan uang elektronik berbentuk chip maupun server. Hasil dalam penelitian ini menunjukkan bahwa negara Indonesia, Malaysia, Thailand, dan Singapura memiliki pengaruh positif signifikan antara volume transaksi uang elektronik terhadap konsumsi rumah tangga. Hal tersebut menandakan bahwa konsumen telah memiliki kepercayaan kepada sistem transaksi pembayaran non-tunai terutama uang elektronik dan merasa bahwa penggunaan uang elektronik lebih efisien, cepat, dan aman.

Kata kunci: *Volume Uang Elektronik, Konsumsi Rumah Tangga, Seemingly Unrelated Regression*

JEL: E40; E21; C33

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Introduction

In the era of globalization, people are required to carry out all activities efficiently and quickly. Globalization also makes the world borderless, causing significant social changes. Information and communication technology at this time is also developing rapidly, becoming essential for all parties, such as individuals, businesses, and governments. One of the sectors significantly impacted by this technological development is the digital economy sector.

The digital economy is currently a phenomenon that is in demand by all economic actors, from payment systems, investment, loans, and donations to buying and selling activities. The digital economy in Indonesia continues to increase from year to year, which can be seen from the increase in electronic money transactions and electronic commerce. In the era of the COVID-19 pandemic, the digital economy has also helped economic recovery in Indonesia due to the implementation of large-scale social restrictions (PSBB) (OJK, 2020). The development of the digital economy has led to the development of financial technology (fintech). It is because financial technology companies continue to evolve so that they can facilitate various digital economy services not only in payment transactions or digital banks but also in terms of loan transactions, crowdfunding, and insurance. Financial technology combines financial services and technology that can change the conventional business model into a moderate one (BI). The existence of financial technology today helps to increase efficiency in the payment system so that people no longer need to use paper money or coins to make transactions.

Based on Bank Indonesia Regulation No. 11/12/PBI/2009 on electronic money, electronic money is a payment instrument that fulfills four elements, namely issued based on the value of money deposited in advance by the holder to the issuer, the value of money is stored electronically in a medium such as a server or chip, used as a means of payment to merchants who are not the issuer of the electronic money. The value of electronic money deposited by the holder and managed by the issuer is not a deposit, as referred to in the laws governing banking (Bank Indonesia, 2009). Electronic money is included as M1 because of its characteristics that have float funds, which is the value of electronic money received by the issuer as a result of the issuance of electronic money or replenishment, which is still an obligation of the issuer to holders and merchants (Bank Indonesia, 2009).

In the narrow sense, M1 is a component of money supply, consisting of currency in the form of banknotes and metals held by the public and demand deposits or current accounts denominated in Rupiah. Following the statement in the International Monetary Fund (2000), float funds can be categorized as transferable deposits or deposits that can be exchanged on demand at nominal and without nominal limitations and can be used directly to make payments by check, draft, giro, debit or credit, or other direct payment facilities. According to Bank Indonesia (2020), the percentage value of electronic money transactions in the third quarter of 2020 or during the pandemic increased by 28.69% or IDR 11.37 trillion compared to the third quarter of 2019, while payment transactions using Payment Instruments Using Cards (APMK) decreased by 9.50% or IDR 187.55 trillion. This significant development gives Indonesia the potential to become Southeast Asia's most prominent digital economy player.

According to Bareksa (2019), the digital economy can be a crucial driver of economic growth in Indonesia. It is because the potential of the digital economy and finance can increase efficiency and productivity. In 2016, consumption growth in Indonesia was relatively high, driven by the ease of buying and selling activities through various platforms such as electronic commerce (Bank Indonesia, 2016). It boosted economic growth then, so economic growth in Indonesia was positive in the third quarter of 2016 amid uncertain global economic

conditions (Ministry of Finance, 2016). The development of financial technology has the potential to bridge the needs and mobilize the activities of the micro, small, and medium enterprises (MSMEs) sector and the wider community. Bank Indonesia also established three main strategies for payment systems in the digital economy era to form a new source of economic growth. These strategies are establishing the Indonesian Payment System Vision 2025, encouraging increased electrification of payment transactions, and encouraging preparation for online marketing of MSMEs to the digital economy.

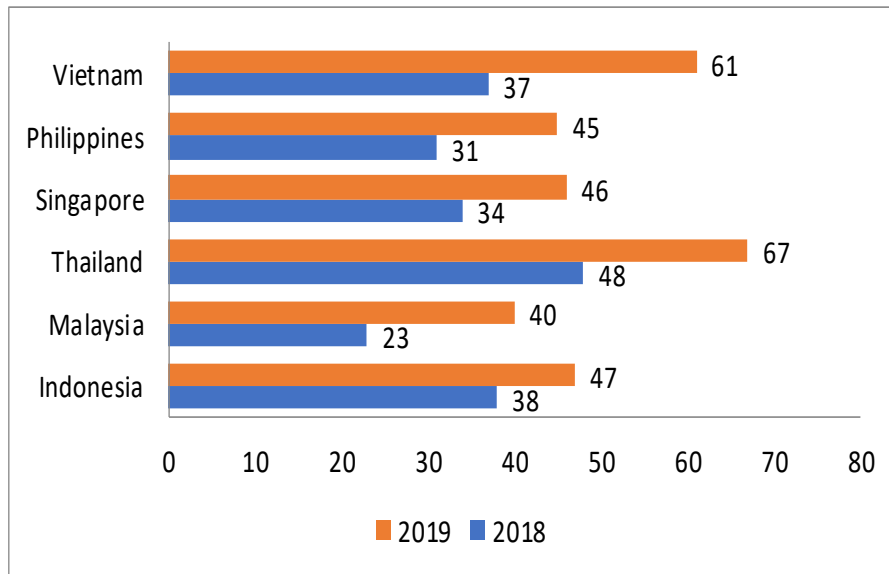


Figure 1: Electronic Money Growth (%), 2018-2019

Source: (PwC, 2019)

The growth of electronic money in six ASEAN countries shown in Figure 1 shows that Thailand had the highest growth in 2019 at 67% compared to the previous year. Based on a report on the electronic money market in Southeast Asia (Nariyanuri, 2021), apart from Indonesia, countries with significant growth in non-cash payment transactions are Malaysia, Thailand, and Singapore. Singapore is a country that has the highest level of adoption of non-cash payments. Namely, adult consumers can make 683 electronic money transactions compared to the average payment instrument using cards (APMK) transaction of 234 transactions in 2019. Electronic money transactions are more frequently used than APMK and can also be found in Indonesia, Malaysia, and Thailand. The total volume of electronic money transactions in Indonesia, Malaysia, Thailand, and Singapore approached 13 billion transactions in 2019. It was much higher than the volume of APMK transactions, which amounted to 4 billion transactions in the same year. In these four countries, e-money is more often used in everyday transactions. At the same time, APMK is more likely to be used for purchases at large retail companies, so it can be concluded that the volume of e-money transactions is higher than APMK. Still, the value of e-money transactions is relatively lower.

Evidence from the empirical literature on the relationship of electronic money transactions to household consumption is shown in journals written by Marshall & Coke (2016) and Tshukudu (2018) saying that with the increase in the use of electronic money, household loans will also increase, which will impact household consumption expenditure. The relationship between electronic money and household consumption will also be negative due to the low use of electronic money and electronic commerce, increased ATM withdrawals by consumers, low-interest payments, and lack of trust in electronic money.

Similar research was also conducted by [Zandi et al. \(2016\)](#) and [Zandi et al. \(2013\)](#), which says that the use of electronic cards generates a boost to economic growth from year to year through various factors such as providing consumer access to credit, providing more efficient transaction services, and consumer confidence in the payment system as a whole. It makes the increasing use of electronic cards able to increase household consumption. Providing consumer or household access to credit will make it easier to increase savings and investment so that household income will also increase ([Prihantono, 2017](#)). When household income increases, the level of consumption will also increase, resulting in a boost to economic growth.

Research with the title “The Effect of Electronic Money Transactions on Household Consumption” was raised by researchers to analyze more deeply the influence of electronic money transactions on household consumption levels in four countries that have the highest gross domestic product in ASEAN with a relatively high contribution to household consumption and experience growth in the volume of electronic money transactions, namely Indonesia, Malaysia, Thailand, and Singapore.

Literature Review

Technology Acceptance Model (TAM)

The technology acceptance model (TAM) is a theory developed by [Davis \(1989\)](#). This model explains that technology acceptance can be influenced by usability and ease of use ([Davis et al., 1989](#)). Davis’ opinion regarding ease of use is that someone believes that technology can be easily understood and used to help with specific jobs. The following indicators can explain the opinion of ease of use:

- a. Easy to learn, that is, consumers can learn how to use the electronic transaction system.
- b. Can be controlled, namely, the available facilities function properly.
- c. Flexibility, namely buying and selling, is carried out smoothly and without significant obstacles and can be done anytime and anywhere.
- d. Easy to operate, namely, electronic payments can be made quickly without experiencing difficulties and the transaction process.
- e. Clear and understandable, namely, the available facilities are complete and do not cause other perceptions.
- f. Easy to become proficient, consumers can access the payment system easily according to their wishes after using it once.

The indicators for the usefulness of use in the Technology Acceptance Model are as follows: Increasing productivity, namely consumer productivity, will increase when making buying and selling transactions. Effectiveness, namely, consumers can save time and energy in making transactions using electronic payments. Functional, namely advantageous for consumers to carry out the buying and selling process online and offline, increasing performance, namely the ease of making transactions make transactions by consumers increase, Speeding up work, namely electronic payments can save time used in the payment and transaction process, Being easier, namely by using electronic payments consumers easily complete the transaction process.

Consumption Theory

Consumption is the goods and services purchased by household consumers. Consumption can be divided into three subgroups, namely nondurable goods, which are goods that are used up in a short time, for example, food and clothing; durable goods, which are goods that have a long life, such as cars and TVs, and services, which are work done for

consumers by individuals and companies such as haircuts and visits to doctors (Mankiw 2016: 26). Household consumption is the building block of GDP. It accounts for two-thirds of GDP, so fluctuations in consumption are an essential element of economic booms and recessions. Keynes' consumption function can be written as:

$$C = \bar{C} + cY \quad \bar{C} > 0, 0 < c < 1 \quad (1)$$

Where C is consumption, Y is disposable income, \bar{C} is constant, and c is the marginal propensity to consume (MPC). Keynes proposed three insights about consumption; Keynes assumed that MPC has a magnitude between zero and one, and the ratio of consumption to income, also called the average propensity to consume, will fall when income rises. Income is the primary determinant of consumption, and the interest rate has no critical role. Keynes' last opinion contradicts classical economists' opinion that higher interest rates encourage savings and discourage consumption (Mankiw, 2016).

Relationship between Electronic Money and Household Consumption

Economic growth can be measured through GDP and consumption functions within it, so consumption changes can directly impact economic growth (Tshukudu, 2018). It makes electronic payment transactions able to contribute to economic development through the spread of productive investment, which can lead to increased household consumption.

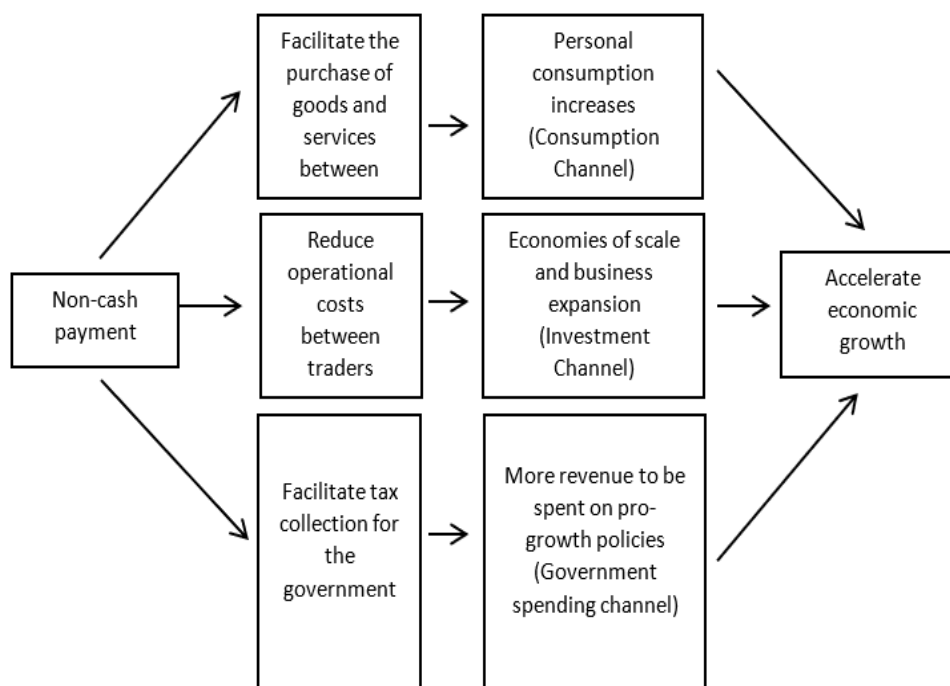


Figure 2: Non-Cash Payment Transmission Channel

Source: et al. (2020)

Figure 2 illustrates how the transmission of non-cash payments can affect economic growth. Bank Indonesia says non-cash payment instruments include Card Payment Tools (APMK), checks, bilyet giro, debit notes, and electronic money (card-based and server-based). In the consumption channel transmission, non-cash payments facilitate the purchase of goods and services between households so that payments become faster, safer, and more efficient, so consumers will find it easier to make transactions, and the level of personal consumption will also increase.

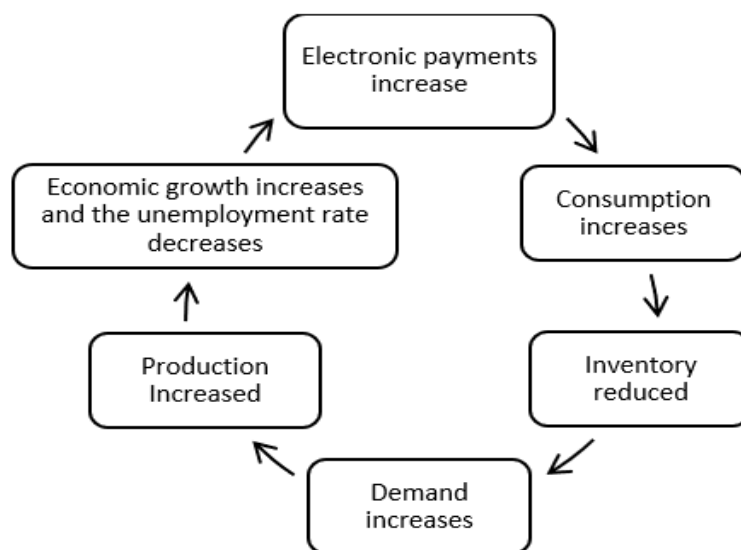


Figure 3: Effect of Electronic Payments on Economic Growth

Source : Slozko & Pelo (2014)

Figure 3 illustrates increased consumption due to increased electronic payments; the supply of goods and services and demand will decrease. The high level of demand will increase the production level, reducing the unemployment rate and increasing economic growth. Cashless payments can also reduce operational costs associated with paper-based transactions, easing merchant operational costs. Furthermore, lower operational costs will result in economies of scale among traders, leading to business expansion and greater levels of investment, thus contributing to economic growth. The last transmission channel is the government spending channel. Cashless transactions facilitate tax collection by the government so that the government can earn more revenue to improve the fiscal balance and increase government spending. Higher government spending will stimulate aggregate demand and thus boost economic growth.

Relationship between Interest Rate and Household Consumption

The Fisher model is used to determine how interest rate changes can affect consumer choices. Economists divide the effect of an interest rate increase on consumption into income and substitution effects. The income effect is the change in consumption caused by the movement of the indifference curve higher, so the income effect makes consumers want more consumption in both periods. The substitution effect is a change in consumption caused by changes in the relative price of consumption in both periods, so consumers consume more in the second period and reduce their consumption in the first period (Mankiw, 2006). An increase in the interest rate can affect people's motivation to save their money in the bank, but when the interest rate is low, people tend to choose consumption activities rather than saving.

Relationship between Inflation and Household Consumption

Inflation causes goods to increase so that it will have a substitution effect between consumption expenditure and savings (Mankiw, 2006). The impact of this inflation is that consumers will reduce purchasing activities on goods with relatively high prices and increase consumption expenditures on relatively low prices. Inflation will also weaken the purchasing power of consumers and reduce consumer confidence in the value of the national currency.

Previous Research

Research conducted by [Marshall & Coke \(2016\)](#) aims to determine the relationship between electronic money, consumption, and sectoral growth in Jamaica from 2008 to 2015. The study used the ARDL model to determine the long-term relationship and the ECM model to determine the short-term relationship. This study has seven dependent variables: consumption, personal consumption, and overall GDP. Five GDPs are divided into each sector, and six independent variables consist of electronic money variables. The results of this study, in the long run, are internet penetration has a negative relationship with personal consumption and overall GDP, internet transaction size shows a positive relationship with overall GDP and the agriculture, forestry, and fisheries sector, point of sale (POS) penetration shows a negative relationship with the GDP of the finance and insurance sector and personal and overall consumption, as well as a negative relationship with the GDP of the food, beverage, and tobacco sector, POS transaction size, has a positive relationship with GDP of the manufacturing sector and the finance and insurance sector and a negative relationship with GDP in the food, beverage, and tobacco sector, automated bank machines (ABM), penetration has a positive relationship with overall GDP and GDP of the finance and insurance sector and a negative relationship with GDP of the food, beverage, and tobacco sector ([Marshall & Coke, 2016](#)).

[Tshukudu \(2018\)](#) researched the causal relationship between electronic money penetration and household consumption in Botswana. This study shows that in the short term, electronic money penetration does not affect household consumption; in the long term, electronic money penetration affects household consumption. In the short term, household consumption affects the penetration of electronic money and vice versa. In the long term, household consumption does not affect the penetration of electronic money ([Tshukudu, 2018](#)).

Research conducted by [et al. \(2020\)](#) investigated the relationship between cashless payments and economic growth in 15 Organization for Economic Co-operation and Development (OECD) countries using panel methods and random effect models. The study proved a positive and significant relationship between cashless payments and economic growth in 15 OECD countries. In particular, debit card payments are shown to impact economic growth positively. However, credit card payments, checks, and electronic money did not affect economic growth in 15 OECD countries. One of the reasons e-money has no relationship with economic growth in OECD countries is the cybersecurity concerns among economic actors. This is evidenced by the World Economic Forum's 2017 Global Risks report, which found that cyber risk was the highest concern for doing business in more than a third of OECD countries. In this case, consumers and merchants will feel reluctant to make purchases using electronic money payments, which has an insignificant impact on growth ([et al., 2020](#)).

Research Methods

The type of research used in this study is quantitative research with a descriptive approach. This study uses secondary data obtained indirectly by researchers through books, journals, and articles. The data used is panel data consisting of cross-section and time series. The research method uses seemingly unrelated regression because each equation has its parameters, and each appears to be unrelated. Still, between these equations, there is a correlation between errors with each other in different equations.

The following is the empirical model in this study:

$$\ln consump_{it} = \alpha + \beta_1 \ln emoney_{it} + \beta_2 nominal_{it} + \beta_3 inf_{it} + \beta_4 \ln gdp_{it} + e_{it} \quad (2)$$

where:

$consump_{it}$: Household consumption (Juta US\$)
α	: Constant
$emoney_{it}$: Electronic money transaction volume (Million transactions)
$nominal_{it}$: Nominal interest rate (%)
inf_{it}	: Inflation rate (%)
gdp_{it}	: Gross domestic product (US\$ billion)
e	: Error term

Analysis Technique

In using the seemingly unrelated regression (SUR) model, it is necessary to estimate the simple panel data regression model first. The stages of analyzing the simple panel data regression model are used to determine the error in each equation. In panel data estimation, there are several tests to get the best model, including:

Chow Test

The Chow Test selects a model between pooled least square (PLS) and fixed effect. The Chow Test has a decision criterion where H_0 is rejected if the p-value is more than α with the hypothesis used:

H_0 : Pooled Least Square Model (PLS)

H_1 : Fixed Effect Model (FEM)

Hausman Test

Testing with the Hausman Test is used to select a model between the fixed effect and the random effect model with the decision criteria rejecting H_0 if the Chi-Square count is greater than the Chi-Square table or the p-value is more than α and the hypothesis used is:

H_0 : Random Effect Model (REM)

H_1 : Fixed Effect Model (FEM)

Classical Assumption Test

The assumption test is carried out to determine whether there are any classical assumption deviations in the model used. The classical assumption test used in this study is the Heteroscedasticity Test. In this condition, the assumption of homoscedasticity is not fulfilled, namely, having the same variance in the classical linear regression model (CLRM). Furthermore, an autocorrelation test is carried out to determine whether there is a correlation between errors. In the context of regression, the classical regression model assumes that errors do not contain autocorrelation. Multicollinearity tests the assumption of the classical linear regression model (CLRM), which is that there is no multicollinearity among the regressors involved in the regression model. This test is conducted to determine how close the relationship between independent variables is.

Seemingly Unrelated Correlation Test

The seemingly unrelated regression (SUR) model has one of the conditions that must be met: having a residual relationship between existing equations or contemporaneous correlation. Contemporaneous correlation is a relationship that occurs when errors in different models are related at the same time. The contemporaneous correlation test can be done using the Lagrange Multiplier test with the H_0 hypothesis that there is no contemporaneous correlation.

Estimation of Seemingly Unrelated Regression Model

seemingly unrelated regression (SUR) is the result of developing a linear regression model consisting of several related regression equations because the errors between different equations are correlated or can be called correlating similarity. At first glance, the seemingly unrelated regression (SUR) model's equations look unrelated but are related through correlation in the errors. The advantage of using the SUR model is that it can accommodate the correlation between the error of one equation and the error of another equation, and this model is considered more efficient because parameter estimation is done simultaneously and involves the correlation of equality. The difference between the seemingly unrelated regression model and the ordinary least square (OLS) model is that the ordinary least square model assumes that the equations in a model are independent and have no correlation or relationship between one equation and another so that the estimation results are thought to be inefficient. In contrast, the seemingly unrelated regression model can explain the relationship between the equations in a model. When viewed from a smaller standard error value, the seemingly unrelated regression method can also be more efficient than ordinary least square.

Results and Discussion

Estimation Results of Panel Data Regression

This study uses panel data, a time series, and cross-section data. Panel data in this study can be estimated using three methods, namely pooled least square, fixed effect model, and random effect model. Table 1 shows the regression results of three-panel data models. The pooled least square model results show that only the independent variable GDP significantly affects household consumption; namely, when GDP increases by 1%, household consumption will increase by 1.281%, *ceteris paribus*. This model has a significant statistical F probability value indicated by the $\text{Prob}>F$ value smaller than 0.05, showing that the independent variables significantly affect the dependent variable. The R-squared value of 0.905 indicates that this model can explain 90.5% variation in the dependent variable.

The results of the fixed effect model show that the independent variable e-money transaction volume has a significant effect on the independent variable household consumption, namely when the volume of e-money transactions increases by 1%, household consumption will increase by 0.07%, *ceteris paribus*. The independent variable GDP also significantly affects household consumption; namely, when GDP increases by 1%, household consumption will increase by 0.47%, *ceteris paribus*. This model has a significant statistical F probability value indicated by the $\text{Prob}>F$ value smaller than 0.05, showing that the independent variables significantly affect the dependent variable. The R-squared value of 0.682 indicates that this model can explain 68.2% variation in the dependent variable.

The results of the random effect model show that only the independent variable GDP has a significant effect on household consumption; namely, when GDP increases by 1%, household consumption will increase by 1.281%, *ceteris paribus*. This model has a significant statistical F probability value indicated by a $\text{Prob}>F$ value smaller than 0.05. Then, it shows that the independent variables significantly affect the dependent variable. The R-squared value of 0.905 indicates that this model can explain 90.5% variation in the dependent variable.

Table 1 : Panel Data Regression Results

Variable Independent	Pooled Least Square		Fixed Effect Model		Random Effect Model	
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Constant	-1.969**	0.876	2.045*	1.088	-1.969**	0.876
EU Transaction Volume	-0.059	0.493	0.070***	0.022	-0.059	0.049
Nominal Interest Rate	-0.026	0.026	-0.008	0.011	-0.026	0.026
Inflation	-0.009	0.031	-0.017	0.016	-0.009	0.031
GDP	1.281**	0.129	0.470**	0.186	1.281***	0.129
R-squared	0.905		0.682		0.905	
F-statistic / Wald chi ²	64.36		12.31		257.42	
Prob>F / Prob>chi ²	0.000		0.000		0.000	

Notes: ***, **, * indicate statistically significant at α 1%, 5%, and 10%, respectively.

The next step is to select the correct panel regression model using the Chow and Hausman tests. After the testing process, it was found that the best model was the fixed effect model (FEM).

Classical Assumption Test

The heteroscedasticity test in this study uses the Wald test with the following hypothesis:

H₀: homoscedasticity

H₁: Heteroscedasticity

The results of the Wald test show that Prob>Chi² is 0.000 or smaller than α (0.05), so H₀ is rejected, so this research data has heteroscedasticity.

Table 2: Wald Test Results

	Model
Chi ²	246.42
Prob>Chi ²	0.0000

The autocorrelation test in this study uses the Wooldridge test with the following hypothesis:

H₀: There is no autocorrelation

H₁: There is autocorrelation

The results of the Wooldridge test show that Prob>F is 0.003 or smaller than α (0.05), so H₀ is rejected, so this research data has autocorrelation.

Table 3: Wooldridge Test Result

	Model
F-statistic	67.276
Prob>F	0.003

The results of the multicollinearity test in this study indicate that the VIF value of the GDP variable and the volume of electronic money transactions is more than ten, and the 1 / VIF value of the GDP variable and the volume of electronic money transactions is less than 0.1. It shows that the data in this study have multicollinearity symptoms.

Table 4: Multicollinearity Test Results

Variable	VIF	1/VIF
GDP	88.82	0.011
EU Transaction Volume	59.49	0.016
Inflation	5.77	0.173
Nominal Interest Rate	3.29	0.303
Mean VIF	39.34	

Seemingly Unrelated Regression

Table 5: Contemporaneous Correlation

Chi ²	Prob.
19.699	0.0031

The requirement to estimate seemingly unrelated regression is that the data must have heteroscedasticity and contemporaneous correlation. Contemporaneous correlation can be known through the Breusch-Pagan LM test with the following hypothesis:

H₀: there is no contemporaneous correlation

H₁: there is a contemporaneous correlation

Based on the Breusch-Pagan LM test, the chi² probability value is 0,0031 or smaller than α (0,05), so H₀ then the equation has a contemporaneous correlation, and seemingly unrelated regression can be done.

Table 6: Seemingly Unrelated Regression Result

Constant	<i>Coef.</i>	6.362***	1.580***	2.973***	-5,359**
	<i>Std. Err.</i>	1.407	0.346	0.401	2,492
Electronic Money Transaction Volume	<i>Coef.</i>	0.086***	0.454***	0.060*	0,919**
	<i>Std. Err.</i>	0.009	0.016	0.034	0,414
Nominal Interest Rate	<i>Coef.</i>	-0.005	0.002	-0.009*	0,002
	<i>Std. Err.</i>	0.007	0.008	0.005	0,003
Inflation	<i>Coef.</i>	-0.009	-0.001	-0.004	-0,002
	<i>Std. Err.</i>	0.014	0.009	0.005	0,007
GDP	<i>Coef.</i>	-0.076	0.059	0.325***	0.445**
	<i>Std. Err.</i>	0.201	0.067	0.105	0.175
R-squared		0.973	0.995	0.980	0.963
Chi ²		318.04	1907.04	470.78	217.90
Prob		0.000	0.000	0.000	0.000

Notes: ***, **, * indicate statistically significant at α 1%, 5%, and 10%, respectively.

Based on the results of seemingly unrelated regression, the independent variable of electronic money transaction volume in Indonesia has a significant effect on household consumption at the 1% significance level; namely, when the volume of electronic money transactions increases by 1%, household consumption will increase by 0.086%, ceteris paribus. In Malaysia, the independent variable of electronic money transaction volume also has a significant effect on household consumption at the 1% significance level; namely, when the volume of electronic money transactions increases by 1%, household consumption will increase by 0.454%, ceteris paribus. In Singapore, electronic money transaction volume has an independent variable that significantly affects household consumption at the 5% significance

level; when the volume of e-money transactions increases, household consumption will increase by 0.919%, *ceteris paribus*. Meanwhile, for Thailand, the independent variable of electronic money transaction volume has a significant effect at the 10% significance level; when the volume of electronic money transactions increases by 1%, household consumption will increase by 0.06%, *ceteris paribus*.

The independent variable of GDP in the Thailand equation significantly influences the dependent variable of household consumption at a 1% significance level. When GDP increases by 1%, household consumption will increase by 0.325%, *ceteris paribus*. Thailand's nominal interest rate variable significantly affects household consumption at the 10% significance level; when the nominal interest rate increases by 1%, household consumption will decrease by 0.009%, *ceteris paribus*. The independent variable Singapore GDP also significantly affects household consumption at the 5% significance level; when GDP rises by 1%, household consumption will increase by 0.4975, *ceteris paribus*. The R-squared values for Indonesia, Malaysia, Thailand, and Singapore show that the model can explain the dependent variable by 97.3%, 99.5%, 98%, and 96.3%, respectively.

Discussion

Every country is starting to increase electronification in all sectors, including the economic sector. Electronic money is one of the outputs of increasing electronification in the economic sector, especially in the payment system. The existence of electronic money is expected to facilitate the buying and selling of goods and services between households so that payments become faster, safer, and more efficient. This study's background aims to determine the effect of electronic money transaction volume on household consumption in four ASEAN countries with the highest economic growth and significant growth in electronic money. Electronic money in this study consists of electronic money in the form of chips and servers.

Relationship between Electronic Money Transaction Volume and Household Consumption

Based on the estimation results using panel data with the seemingly unrelated regression model, it is obtained that all sample countries have an independent variable, namely the volume of electronic money transactions, which has a significant effect on the dependent variable, namely household consumption. In Indonesia, if the volume of electronic money transactions increases by 1%, household consumption will increase by 0.086%, assuming *ceteris paribus*. In Malaysia, if the volume of electronic money transactions increases by 1%, household consumption will increase by 0.454%, assuming *ceteris paribus*. In Thailand, if the volume of electronic money transactions increases by 1%, household consumption will increase by 0.060%, assuming *ceteris paribus*. In Singapore, if the volume of electronic money transactions increases by 1%, household consumption will increase by 0.919%, assuming *ceteris paribus*. The estimation results follow research conducted by [Marshall & Coke \(2016\)](#) [Zandi et al. \(2016\)](#); and [Zandi et al. \(2013\)](#).

Relationship between Nominal Interest Rate and Household Consumption

This study's nominal interest rate variable is helpful as an independent variable. In the estimation results, it is known that only Thailand has a significant relationship between nominal interest rates and household consumption; when nominal interest rates increase by 1%, household consumption will decrease by 0.009%, *ceteris paribus*. The results align with research conducted by [Zandi et al. \(2016\)](#) and [Zandi et al. \(2013\)](#) state that nominal interest rates have a significant negative relationship with household consumption. These results also follow research written by [Campelo et al. \(2020\)](#); [Keho \(2019\)](#); [Senkantsi \(2016\)](#) which states a

negative relationship between nominal interest rates and household consumption. Meanwhile, in the other three sample countries, namely Indonesia, Malaysia, and Singapore, nominal interest rates do not significantly affect household consumption. One of the reasons why the relationship between nominal interest rates and household consumption is insignificant is that other factors should be included in the concentration of this study. One such factor that may be the reason why the relationship of nominal interest rates to household consumption in Indonesia, Malaysia, and Singapore is not significant is that nominal interest rates relatively do not affect the growth of household savings, or it can be said that interest rates are not an attraction for households to save or invest their funds in banks.

Relationship between Inflation and Household Consumption

The inflation variable was not found to have a significant effect in the sample countries in this study. This can be because there are other factors that are not included in the model in this study, such as the level of household income that increases from year to year so that price increases in goods and services do not affect household consumption activities.

Relationship between Gross Domestic Product and Household Consumption

This study's gross domestic product variable is used to measure economic growth in the sample countries. The gross domestic product variable has a positive and significant relationship in two sample countries, namely Thailand and Singapore. When Thailand's gross domestic product increases by 1%, household consumption in Thailand will increase by 0.325%, ceteris paribus. When Singapore's gross domestic product rises, household consumption in Singapore rises by 0.445%, ceteris paribus. This study's results align with research conducted [Al Rasasi et al. \(2019\)](#), which states that there is a causal relationship between gross domestic product and household consumption. However, in Indonesia and Malaysia, the relationship between gross domestic product and household consumption was insignificant and in line with the research ([Amin, 2011](#)). The cause of the insignificant relationship between gross domestic product and household consumption is that other factors should be included in this study. The insignificant relationship in Indonesia and Malaysia can also be caused because household consumption is more of a component that affects economic growth or gross domestic product; this is because, on the expenditure side, there are components that affect the amount of gross domestic product, namely household consumption, followed by non-profit institutions that serve households, government consumption, and investment.

Conclusion

Based on the results of research and discussion, it is concluded that the effect of electronic money transaction volume in four sample countries, namely Indonesia, Malaysia, Thailand, and Singapore, is found to have a significant relationship with household consumption. The relationship between the volume of electronic money transactions and household consumption is positive; when the volume of electronic money transactions increases, household consumption will also increase. Independent variables consisting of nominal interest rates, inflation, and GDP significantly relate to household consumption in Thailand. The relationship between nominal interest rates and inflation variables significantly negatively affects household consumption in Thailand. The GDP variable relationship has a positive relationship to household consumption in Thailand. The independent variable of GDP in Singapore has a significant positive relationship to household consumption in Singapore. Independent variables consisting of electronic money transaction volume, nominal interest rates, inflation, and GDP in Indonesia, Malaysia, Thailand, and Singapore simultaneously affect the dependent variable consisting of household consumption.

Based on the results of the research and discussion that has been carried out in the previous chapter, the appropriate advice that can be recommended from this research is to improve literacy about electronic money further so that all circles of society can feel electronic money facilities and are better able to influence household consumption. In addition, the government or central bank can further emphasize the regulations on using the value or amount of electronic money so that the inflation rate can remain under control. Future research is expected to use more observations by adding the number of countries to the entire ASEAN, consisting of ten countries. Future research can add dummy variables before the implementation of electronic money. Some of the research limitations contained in this study are that the study only uses 32 observations (2012-2019 and four countries), this study does not include a dummy before the implementation of electronic money, and this study, other than electronic money, does not include non-cash payment variables.

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