Services of Financial Technology (Fintech);
Two Stage Least Square Method

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Abstract. Fintech is a company engaged in financial services that combined with technology. The use of innovative technology makes the financial industry more efficient and improves the quality of financial services. A startup is a financial services company that uses Fintech. Several factors affect services Fintech: from the consumer side of demand, namely the price of consumer goods as a credit loan application. From the company side, supply is influenced by income from creditors and the price of goods, the interest rate on credit is reflected by the margin which is a factor that affects the price of goods/services demand. Prices will affect services Fintech. From supply and demand side, it is suspected that there is a simultaneous price relationship between supply and demand for services Fintech. The study will use a simultaneous model with the two stage least square (TSLS) method. The study used undergraduate students at the University of Lampung as respondents. The results of the study do not occur simultaneously with price variables on the demand and supply of services Fintech.

Keywords: Fintech, TSLS, Services

1 Introduction

Financial technology (fintech) is a new paradigm where information technology encourages innovation in the financial industry and develops rapidly. Fintech is one of the companies engaged in financial services combined with technology. Fintech makes the financial industry more efficient and improves the quality of financial services. From a banking point of view, the benefits of online banking will provide a level of efficiency in terms of operational costs, time, information, communication within the organization and comfortable interaction with prospective customers. According to [1], suggest that the participants of the technology ecosystem in the growth of fintech are entrepreneurs, governments, and financial institutions. Startup Fintech ecosystem is one element technology. The difference financial services of fintech using innovative technologies offered by companies, analyzed the advantages and disadvantages of these services in comparison to the services offered by traditional financial sector companies [2], Research also claims that startup companies fintech generate financial system efficiency [3], [4]. The potential market for service users is fintech very broad, especially adults [5]. The increasing number of users who cannot use traditional banking services contributes to the development of FinTech.

In Latvian community, research evaluates how ready the Latvian community to use services fintech, and the results was that the Latvian people are not ready to use services fintech[2]. This technology enables the financial facilitation process to be more convenient, faster, and more cost-effective. Fintech has great opportunities in Indonesia and at the same time, the government has covered Fintech customers with regulatory authorities. Financial services using fintech will also experience advantages and disadvantages and risks that will be

experienced by both companies and consumer users. It is hoped services fintech that provide convenience, speed and security as well as consumer satisfaction will increase consumer interest.

Several financial service institutions have used digitization in their products by providing services online to speed up the process credit application, this is in line with the Financial Services Authority master planNo.77/POJK.01/2016.

Formulation Problem

Startups are financial services companies that use Fintech. These financial services are strongly influenced by the number of requests for services Fintech. Several factors affect the offering of services Fintech: from the consumer side, namely the price of consumer goods as a credit loan application and risk. The amount of risk given to consumers will reduce the number of services provided by financial institutions.

From the side of companies Fintech, demand is influenced by the amount of income from creditors and the price of goods needed. Financial credit financing is indicated by the credit interest rate as reflected by the margin. On the other hand, the high and low interest rates reflect the economic condition of a country [6]. Therefore, the interest rate (margin) set by the company is one of the factors that affect the price of goods/services demand foodservices Fintech.

The price of goods is a factor that affects both the demand side of the company and the company side Fintech. On the other hand, consumer demand will also affect the number of offers from companies Fintech. This study will examine the effect of price on the demand and supply of services Fintech, Cicil.co.id. This study will analyze whether there is a simultaneous relationship between the price factor and the demand and supply of services Fintech.

2 Literature Review

Fintech is also defined as technological innovation in financial services that can produce business models, applications, processes or products with material effects related to the provision of financial services. In a broader sense, fintech is seen as a new market that combines finance and technology and replaces traditional financial structures with new technology-based processes. Financial transactions through fintech include payments, investments, lending money, transfers, financial plans and comparisons of financial products. Based on the analysis of fintech development and the uniqueness of this business, the comparative advantages of fintech were identified, including highly standardized and low-cost financial services; internet-based and therefore less geographically concentrated; changing consumer behavior; lower regulation of financial services.

In the concept of demand, an increase in the price of a product (ceteris paribus) will cause a decrease in the quantity demanded of a good. Another thing that will also shift the demand curve is the influence of the prices of other goods and consumer tastes. Meanwhile, in the aspect of consumer behavior, there are a number of real individual actions (consumers) that are influenced by internal and external factors that direct consumers to assess, choose, obtain and use the desired goods and services.

Margin is the amount of gross profit received by the company acting as a producer or the difference between production costs and the market selling price. In general, financing customers make payments in installments. Claims arising from sale and purchase transactions and/or leases based on this agreement are referred to as receivables by the service provider

company. The amount of receivables depends on the platform financing, namely the amount of financing (purchase price plus cost price) stated in the financing agreement. If the margin set by a platform is too high, the project proponent or party who needs funds will discourage their intention to apply for funding. Because after all, the project proponent would want the margin of the loan covered to be reasonable. In other words, on platforms that set high margins, the number of "goods" demanded or the number of consumers submitting submissions has decreased.

According to [7] supply is the quantity supplied positively related to the price of goods. Relationship between price and quantity. What is offered is called the law of supply with other things being equal, when the price of a good increases, so does the quantity the goods supplied will increase. The analysis of supply and demand that occurs in an industry can be used to describe the shape of the market mechanism that occurs. Through price control or other policies without any intervention from the government in a market, supply and demand will reach equilibrium to produce the market price of a good and the total quantity produced.

Financial Technology (Fintech)

Fintech can be defined as the utilization of information technology developments to improve services in the financial industry. Along with the development of technology, the types of Fintech are increasingly diverse, including financial technology innovations related to payments and transfers, financial service institutions, and Fintech start-up companies that use new technology to provide services that are faster, cheaper, and more convenient. According to Financial Services Authority, the types of Fintech in this sector include Peer-to-Peer (P2P) Lending, Crowdfunding, Supply Chain Finance, and others. All of Fintechs these provide convenience for financial consumers to buy and use financial products and services at this time.

Cicil.co.id is a start-up financing that provide mortgage services to students. The services provided to meet the needs of students with the costs incurred to obtain these items can be paid in installments thanks to the cicil.co.id service. Cicil.co.id service does not use an interest system like other start-ups financing. This start-up uses a low-value margin system. Services Fintech that provide convenience, speed and security as well as consumer satisfaction will increase the interest of service users.

3 Methodology and Data Analysis

3.1 Types and Sources of Data

Several types of Start-up -based services Fintech in Indonesia include providing Financing and Investment products, namely loan and investment services for the community. Service Fintech users in Indonesia are dominated by people aged 19-34 years (69.81%) and student status. Startup Cicil co.id is a service Fintech which is one of the services that offers special financing services for active students. Services offered to help pay for tuition needs. Bandar Lampung is one of the cities where services are Fintech provided, Cicil.co.id. Some students from the University of Lampung are recipients of services Fintech, Cicil.co.id (forlap.ristekdikti.go.id). In this study, active students are active students studying at the University of Lampung (UNILA) with ages between 19-25 years. In this study will use the method Purposive Sampling. To obtain sample data, the method will be used Snowball Sampling

3.2. Variable Operational Definitions:

1. **Quantity of Service Request Fintech (Qd)**
   The quantity of service request Fintech is the amount of funds borrowed by consumers or the public to service providers, namely companies or startups based on Fintech for consumption, which are expressed in Rupiah.
2. **Quantity of Service Fintech Offers (Qs)**
   The quantity of service Fintech offerings is the amount of funds channeled or lent by company's startup to consumers for the purpose of consumption expressed in Rupiah.
3. **Price of Goods (P)**
   The price of goods is the value that must be issued to obtain the goods needed which are expressed in rupiah.
4. **Student Income (YM)**
   Student income is the amount of wealth owned or obtained by students every month which can be allocated for consumption purposes, expressed in rupiah.
5. **Profit Margin of Service Fintech Companies (MR)** Profit margin is the amount of profit received by the service provider startup based on the results of the agreement on the services that have been provided to consumers expressed in rupiah.

3.2. Specification of Data Analysis Model

The data analysis technique used in this research is simultaneous equation regression analysis. This analysis is to determine the relationship between demand and supply of Fintech where services there are variables that influence each other. The specifications of the model used in this study are as follows:

Structural Regression Model Equation

Fintech Demand Function:
$$Qd_i = 0 + 1\ P_i + 2\ YM_i + 3\ MR_i + 1 \dots\dots\dots\dots\dots \dots (3.1)$$

Description:

Qd	= Quantity of goods/services Fintech requested/needed by consumers
P	= Price of goods needed/offered
YM	= Student income
MR	= Margin / Interest rate set by companies Fintech based on services that have been/will be provided.
$\beta_1, \beta_2, \beta_3$	= Regression coefficient
β_0	= Constant / intercept
ε	= Error term
i	= Data Cross Section

Demand Fintech equation:
$$Qs_i = \gamma_0 + \gamma_1\ P_i + \varepsilon_{2i} \dots\dots\dots\dots\dots \dots (3.2)$$

Description:

Qs	= quantity of goods / services offered by the company Fintech
P	= Price of items needed
γ_1	= Regression coefficient
γ_0	= Constant / intercept
ε	= Error term
I	= Data Cross Section

Equation Model Simultaneous

Reduced Form Using a Formula Balancing Market

$$Qd = Qs$$
$$\beta_0 + \beta_1\,P_i + \beta_2 YM_i + \beta_3 MR_i + \varepsilon_{1i} = \gamma_0 + \gamma_1\,P_i + \varepsilon_{2i}$$

Balanced Price :

$$P_i\,(\beta_1 - \gamma_1) = (\gamma_0 - \beta_0) - \beta_2 YM_i - \beta_3 MR_i + (\varepsilon_{2i} - \varepsilon_{1i})$$
$$P_i = \frac{(\gamma_0 - \beta_0)}{(\beta_1 - \gamma_1)} - \frac{\beta_2}{(\beta_1 - \gamma_1)} YM_i - \frac{\beta_3}{(\beta_1 - \gamma_1)} MR_i + \frac{1}{(\beta_1 - \gamma_1)}(\varepsilon_{2i} - \varepsilon_{1i})$$
$$P_i = \Pi_0 + \Pi_1\, YM_i + \Pi_2\,MR_i + v_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\text{(3.3)}$$

Where:

$$\Pi_0 = \frac{(\gamma_0 - \beta_0)}{(\beta_1 - \gamma_1)}\ ;\ \Pi_1 = -\frac{\beta_2}{(\beta_1 - \gamma_1)}\ ;\ \Pi_2 = -\frac{\beta_3}{(\beta_1 - \gamma_1)}\ ;\ v_i = \frac{(\varepsilon_{2i} - \varepsilon_{1i})}{(\beta_1 - \gamma_1)}\dots\dots\dots\text{(3.4)}$$

substitution results in a balance of price equation offer models simultaneous equations obtained
$$\hat{P}_i = \Pi_0 + \Pi_1\,\widehat{YM}_i + \Pi_2\,\widehat{MR}_i + v_i \dots\dots\dots\dots\dots\dots\text{(3.5)}$$
$$\hat{Q}_i = \Pi_3 + \Pi_4\,\widehat{YM}_i + \Pi_5\,\widehat{MR}_i + w_i \dots\dots\dots\dots\dots\dots\text{(3.6)}$$

Simultaneous Equation Estimation Method The estimation

of the simultaneous equation model begins with identification to determine whether the simultaneous equation model can be estimated or not. From the identification results, it can also be seen that the appropriate estimation method is used in the simultaneous equation. There are three possibilities that occur to the simultaneous equation model, namely: unidentified (unidentified), identified (identified), and (over identified over identified). The conditions required in the identification of the simultaneous equation model, namely [8]: over identified carried out , the estimation is using the two-stage least squares analysis method covering

3.3. Simultaneity

Test Hausman test is conducted to examine the simultaneity problem that occurs because several endogenous independent variables tend to be correlated with the error term. If a simultaneous problem occurs, which means there must be a method other than OLS; otherwise we can use OLS. The OLS estimator will produce a consistent and efficient estimator if there are no simultaneous equations in a model. By using the 2SLS method, we will produce a consistent and efficient estimator.

3.4. Model Specification Test.

The model specification test is based on statistical criteria through a partial significance test (test t), simultaneously (test F) and a test of the coefficient of determination (goodness of fit). The test or test was t partial significance conducted to determine whether the independent variable partially significantly affected the dependent variable. With the hypothesis:

$H_0 : \beta_0 = 0$, the independent variable has no effect on the dependent variable
$H_a: \beta_i \neq 0$, independent variable affects the dependent variable

Test is carried out by comparing the test value t from the calculation results with the test value t obtained from the table Standard Normal Distribution t. The statistic test was F conducted to determine whether the independent variables jointly affect the dependent variable. The test is carried out by comparing the test value F from the calculation results with the test value F obtained from the Distribution Table F. The coefficient of determination test is to see the percentage of the total variation of the independent variables that can be explained by the regression model. Testing is done by looking at the Adjusted R-Squared

4 Research Results and Discussion

4.1. Research Results
Variable Identification Test Identification
Test using Order Condition

Based on the structural equation model and simultaneous equation (3.5) and (3.6), the variable identification test uses the order condition.

    a. In the service demand function equation Fintech , we get
$K - k > M - 1 => 2 - 2 < 2 - 1 =>$**under identified**
    b. In the service offering function equation Fintech, we get;
$K - k > M - 1 => 2 - 0 > 2 - 1 =>$**over identified identification**

The results through the order condition that to regress the two equations above can use the method Two Stage Least Square (TSLS/2SLS) because the identification results show that the equation in the function of offering services is Fintech too identified (over identified).

4.2. Estimation Results
Factors influencing demand and supply of services Fintech

Demand for services Fintech
From the regression results of equation (3.1) the equation for service demand Fintech.
(Qd) ;$Qd_i = \beta_0 + \beta_1 P_i + \beta_2 YM_i + \beta_3 MR_i + e_{1i}$

following results are obtained:

The results of the estimation of the service demand equation Fintech (Qd):
Qd_i $= 780.380 - 0.617502\ P_i - 0,111159\ Ym_i + 9.304313\ MR_i + 1i$
T-count $= (5.2169)\ (-1.3698)\ (-0.9262)\ (4.1605)\ R^2 = 0.9161$
F – statistic $= 320.1644$

Based on the regression results, that the effect of price, profit margin, and student income on the demand for services Fintech at the University of Lampung is as follows:
Price variable (P) price has a negative effect on the number of service requests Fintech but significant with confidence ($\alpha = 5\%$). The variable profit margin of the company (Mr) has a coefficient value of 9.3043, and the effect is significant with a confidence number ($\alpha = 1\%$).

Student Income Variable (YM) has a coefficient value of negative 0.1112, and the effect is significant with the confidence number ($\alpha = 5\%$).

The results of the analysis of the coefficient of determination (R^2) is equal to 0.9161 which indicates that the effect of the price variable (P), income students (YM) and profit margins (MR) to the quantity of service requests Fintech (Qd) amounted to 91.61%. Meanwhile, 8.39% is influenced by other variables not discussed in the study.

Fintech service offerings

From the regression results of equation (3.2) the service offering equation Fintech (Qs);
Qsi= $\gamma0 + \gamma$ 1 Pi+ e2i

Results Estimates service supply equation Fintech (Qs):

Qsi	= 652,291.2 +1,212196Pi + e2i
T-count	= (4.5703) (28.1165)
R^2	= 0.8978
F-statistic	= 780.5382

Based on the regression results that Price (P) has a positive influence on the number of service Fintech offerings at the University of Lampung with a coefficient of 1.2122, and the effect is significant with a confidence number ($\alpha = 1\%$) .

The estimation results of the coefficient of determination (R^2) of 0.8978 which indicates that the effect of the price variable (P) to the quantity of service offerings Fintech (Qs) amounted to 89.78%. Meanwhile, 10.22% is influenced by other variables that are not included in this study.

Simultaneity

Test The test is Hausmann used to test Simultaneity with the following stages:

Variable Regression P to YM and MR
model of simultaneous equations obtained:

$$\hat{P}_i = \Pi_0 + \Pi_1 \widehat{YM}_i + \Pi_2 \widehat{MR}_i + v_i \dots\dots\dots(3.7)$$
$$\hat{Q}_i = \Pi_3 + \Pi_4 \widehat{YM}_i + \Pi_5 \widehat{MR}_i + w_i \dots\dots\dots(3.8)$$

Regression equation (3.7) uses the OLS method to obtain the residual value (v_i) and the predicted value price ($\hat{P}i$) so that it can be made as the following equation:
$$Pi = \hat{P}i + vi \dots\dots\dots (3.9)$$

Table 1. of P Variable Regression Results Against YM and MR

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	28229.31	35045.84	0.805497	0.4227
MR	4.933418	0.055202	89.37077	0.0000
YM	0.042614	0.027857	1.529767	0.1296

R^2	= 0.9923
F-statistic	= 5748.735

The estimation results that the effect of profit margins and student income on prices are;

positive value of 4.9334 to the price of goods in the proposed and significant. Student income variable has a coefficient value of 0.0426, a positive and insignificant effect on the price of goods. The estimation results of the coefficient of determination (R^2) of 0.9923 that shows the influence of independent variables student revenue and profit margins against the proposed price is equal to 99.23%. Meanwhile, 0.77% is influenced by other variables that are not included or discussed in this study.

The estimation results of equation (3.7) will be used for the prediction of price variables (i) and the residual value (vi) from the equation. The magnitude of these results will be used to determine whether there is a simultaneity problem between demand and supply of services Fintech by looking at the relationship that occurs between the dependent variable, namely the service quantity variable (Q) and the residual value from the regression equation (3.7). Results of regression equation (3.9) above we can enter into the equation (3.2), in order to obtain the following equation:

$$\hat{Q}_i = \gamma_0 + \gamma_1 \hat{P}_i + \gamma_2 \hat{v}_i + e_{2i} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(3.10)$$

The estimation results of the equation (3.10) can be used to determine whether there is a simultaneity problem or not in the equation of demand and supply ofservices Fintech at the University of Lampung. Simultaneity problem will occur in equation (3.2) where Pi e2i interconnected and vice versa simultaneity problem will not arise if Pi e2i are not interconnected. (Widarjono, 2016; 262).
The results of the regression Q Value $\hat{P}$i residual (vi):

Table 2. Against the regression results Variable QValue $\hat{P}i$ And Residual(vi)

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	612160.3	132313.2	4.626600	0.0000
P_0	1.226359	0.040010	30.65169	0.0000
RESIDU_V	-0.617502	0.454747	-1.357904	0.1779

* P_0 is predictive variables price (i)and RESIDU_V is the residue(vi)
R^2 = 0.9117
F-statistic   = 470.6849

Based on the regression equation (3.10) that the effect of price predictions (i) and residual values (vi) to the quantity of service offerings Fintech (Qi) shows that the probability that occurs in the residual value (vi) which is equal to 0.1779 is not significant. Thus, in this case it can be said that there is no simultaneity problem between the two dependent variables, namely the price variable (P) and the service quantity variable, which means the null hypothesis (H0) is rejected.

4.3. Discussion

The demand for services Fintech that occurs among students at the University of Lampung is influenced by student income and the amount of company profit margins set by the service provider (Cicil.co.id). But the price variable has no significant effect on the number of service requests Fintech Cicil.co.id. Magnitude profit margin determined by the company Cicil.co.id at every submission using services Fintech performed by each consumer that is

approximately 20% of the price of goods submitted to the service. This results in an increase in the price of the proposed goods so that this price becomes higher than the price prevailing in the market for that type of goods. It can be said that the amount of profit margin has an indirect influence on changes in the demand for services Fintech, the margin has a significant influence on the demand for services Fintech decrease. through changes in the price of goods. Student income has a negative effect, which means that if there is an increase in student income, student interest in using these services will reduced so that the demand for services Fintech will decrease.

The offer of services Fintech carried out by the Cicil.co.id company to students at the University of Lampung, is positive, which means that the greater the total price of goods submitted using services, the Cicil.co.id's greater Fintech the quantity of services offered by the company. The results showed that there is no simultaneity problem between demand and supply of services Cicil.co.id Fintech among students at the University of Lampung. This means that the relationship that occurs between the two endogenous variables of demand and supply from the equation is not a mutually influencing relationship. The quantity of services offered by the company is strongly influenced by the quantity demanded by consumers as seen from the amount of the price submitted on the application for the service submission Fintech cicil.co.id.

5   Implication and Suggestion Future Research

Student income and the amount of profit margin set by the company as a form of pricing policy on services Fintech have a significant influence on the demand for services Fintech that occurs among students at the University of Lampung. Simultaneity test with test Hausmann results that there is no simultaneous relationship between the two dependent variables, namely the price variable (P) and the service quantity variable. The company's profit margin, which in this case is a company policy that can affect the price, the service provider company should be Fintech able to consider the amount of a low profit margin in order to increase the demand for services Fintech.

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