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What Determine Loan Rate and Default Status in Financial Technology Online Direct Lending? Evidence from Indonesia

Wimboh Santoso¹, Irwan Trinugroho², and Tastaftiyan Risfandy²

¹*Otoritas Jasa Keuangan (OJK), Jakarta, Indonesia;* ²*Faculty of Economics and Business, Universitas Sebelas Maret, Surakarta, Indonesia*

ABSTRACT: Using a large-scale dataset from three leading online peer-to-peer (P2P) lending platforms in Indonesia from 2014 to 2018, we investigate the determinants of platform interest rate and borrowers' default status. Our result shows that loan and borrowers' specific factors are significantly associated with the loan rate and loan default, although the relation could differ from one platform to another. Our empirical result shows that platforms focused on very small loan for microbusiness increase their interest rate after the introduction of formal regulation. It could be because of the increase of the borrowers requiring a very small amount of loan relatively much more than the number of lenders. The shortfall of supply then drives the increase in loan rate. Some policy implications are discussed.

KEY WORDS: borrowers-specific characteristics, default status, financial technology, loan rate, loan-specific factors, peer-to-peer lending, regulation

1. Background

Indonesian policymakers have made substantial efforts to promote small business lending over the past decade through the traditional banking system. Some affirmative programs from the government have also been launched such as the small-scale loan (*Kredit Usaha Rakyat/KUR*) dedicated to improve access to finance for micro and small enterprises which in turn is expected to boost economic development. The government has also established the National Strategy for Financial Inclusion launched by Presidential Decree in 2012 which now targeting a near doubling of the proportion of the population with bank accounts to 75% by end 2019. Those efforts have improved access of small firms to formal financial institutions, however, the barriers to small business financing still exist. A substantial number of underbanked households, as well as micro and small enterprises, are even still trapped in illegal predatory lenders or loan sharks (Karsidi et al. 2015; Trinugroho et al. 2015).

Technological-based financial innovations have been rising significantly in most countries in the world including Indonesia over the last few years to ease in delivering financial services and to improve financial activities. It is in line with the growing level of internet and smartphone penetration which enables the potential for a digital transformation in many aspects including the financial sector. Recently, financial innovations driven by technological advancement (financial technology/fintech) are reflected in some forms such as digital (mobile and internet) payments, electronic money, crowdfunding, peer-to-peer (P2P) lending, investment, financial aggregator, and financial advisor. In here, we focus on online direct (P2P) lending which could directly help improve access to financing for micro and small enterprises. P2P lending platforms facilitate direct lending from surplus spending units to deficit spending units in an online system (Milne and Parboteeah 2016). The system could be considered to eliminate some intermediary processes normally happen in the traditional banking system due to the benefit from internet-based information processing.

Address correspondence to Wimboh Santoso, Otoritas Jasa Keuangan (OJK), Jalan Lapangan Banteng Timur 2–4, Jakarta 10710, Indonesia. E-mail: wimboh@gmail.com

P2P lending has also been thriving substantially in Indonesia. According to the data in February 2019, 99 platforms have been registered and monitored in the Indonesia Financial Services Authority (*Otoritas Jasa Keuangan/OJK*). Moreover, as of January 2019, IDR 25.99 trillion (approx. USD 1,758 million) have been channeled to more than 5 million borrowers and involving around 267,000 lenders. In line with this, the growing need of access to financing from SMEs with low access to banks creates a large opportunity to P2P lending mechanism to grow even further. Thus, it is necessary to ensure consumer protection both for the borrowers and lenders regarding the safety of the transaction and investment and reducing fraud.

In this article, using the Indonesian setting, we try to answer two following important questions: (1) what factor drives borrowers' loan default? (2) what are the determinants of interest (loan) rate in P2P lending markets? Loan default has been of academic interest recently because the extent of default could be caused by one of the main problems in P2P lending market: information asymmetry between borrowers and lenders (Lin, Li, and Zheng 2017). In the concept of traditional financial intermediary such as a bank, the extent of information asymmetry will be reduced by performing screening processes. Predicting creditworthiness of the borrowers is understandably hard, even if it is performed by financial intermediaries (Iyer et al. 2015). Moreover, in the context of P2P lending, where borrowers and lenders can meet virtually and implement loan business, this process will be harder because it will be lenders themselves who have to assess borrower's creditworthiness using only information provided in the online platform. On other words, it will be individual investors who bear the credit risk instead of financial institutions (Serrano-Cinca, Gutiérrez-Nieto, and López-Palacios 2015). Furthermore, because lenders are assumed not expert in the screening process and have little knowledge on credit risk management (Guo et al. 2016), the rate of default in P2P lending markets could be substantially high compared to the traditional financial intermediary. Considering these characteristics, P2P lending has a greater risk (and therefore greater default probability) when extending credit than do traditional lending modes because of high information asymmetry (Pope and Sydnor 2011).

We also focus on P2P lending interest rate setting mechanism because it is an emerging issue in online P2P loans (Dietrich and Wernli 2016). In general, there are two types of interest rate setting mechanism: the reverse auction process and the posted price. In the auction mechanism, the borrower candidates post their loan application on the online platform and lender candidates bid their investment amount with a corresponding minimal interest rate during the auction period. In the posted price mechanism, it is platforms that set the interest rate for each loan listing based on the information available from the borrowers. Usually, the platforms also show a credit score to the lender candidates as to represent borrower creditworthiness. To date, the posted price mechanism is more widely used in the world including Indonesia than the auction process. This might be because the process on posted price mechanism is relatively simple, and it also shortens the process for borrowers and lenders (Dietrich and Wernli 2016).

We use individual loan data generated by three major P2P lending platforms in Indonesia from 2014 to 2018. Furthermore, our datasets also allow us for taking advantage of the regulation on online-based lending that issued formally by OJK in the late of 2016. The regulation covers all aspects related to the P2P lending and aimed to regulate and control not only platforms but also lenders and borrowers. The regulation is issued with the expectations to minimize credit risk, protecting users' interests (e.g., misuse of users' fund and data), and protecting national interests (e.g., prevention of money laundering activities and terrorism funding). Therefore, in relation to our study, our third purpose of this study is to investigate whether the establishment of the formal regulation by OJK is able to decrease the interest rate and loan default in P2P lending activities.

To the best of our knowledge, this is the first comprehensive research empirically investigates some issues related to P2P lending in Indonesia. Recent studies on P2P lending have been done mostly in the context of the United States (Chen, Zhou, and Wan 2016; Dorfleitner and Oswald 2016; Emekter et al. 2015; Freedman and Jin 2017; Lin, Li, and Zheng 2017; Nowak, Ross, and Yencha

2018; Serrano-Cinca and Gutiérrez-Nieto 2016; Serrano-Cinca, Gutiérrez-Nieto, and López-Palacios 2015) and China (Chen, Huang, and Ye 2018; Ge et al. 2017; Han et al. 2018; Hu et al. 2019; Jiang et al. 2018; Liu et al. 2018; Xu and Chau 2018), while some other studies use a setting of developed countries such as Germany (Barasinska and Schäfer 2014; Dorfleitner et al. 2016), Switzerland (Dietrich and Wernli 2016), and United Kingdom (Atz and Bholat 2016). Therefore, this study will have a great contribution to the literature in P2P lending because empirical study about this issue in emerging markets is very limited. More specifically, our works will contribute to the scarce literature about the determinant of P2P lending interest rate (Berger and Gleisner 2009; Collier et al. 2010; Dietrich and Wernli 2016). We also believe that the result of our study could be generalized in the broader context because we use three platforms, and it enables us to analyze the difference in loan rate and default status across the platform business model. Other contribution from this work is that while the introduction of formal regulation of P2P lending in Indonesia is expected to enhance the performance of P2P platforms, this study also takes into account of the regulatory change, the issue that is also rarely explored in the prior works (Fong 2015; Wang, Shen, and Huang 2016).

The rest of the article is organized as follows. Section 2 reviews the related literature on P2P lending. Section 3 explains the data and empirical strategy. Section 4 discusses the empirical results. Section 6 concludes the article.

2. Brief Review of Prior Related Empirical Works

The default probability of P2P lending market is of significant concern to platforms and investors in online P2P lending (Jiang et al. 2018) and has been of researchers' interest recently. A stream of literature observes soft and hard information disclosed in P2P lending platforms to predict loan default. Jiang et al. (2018) demonstrate that soft information extracted from the description of loan text in the P2P platform can help identify borrowers who may default on loans, whereas Dorfleitner et al. (2016) conversely find that text-related factors (e.g., spelling errors and text length) hardly predict default probabilities in P2P lending mechanism for two platforms in Germany. Consistent with Dorfleitner et al. (2016), Xu and Chau (2018) also observe that default ratio in P2P lending is difficult to predict. Nowak, Ross, and Yench (2018) find that loan description written by the borrowers can be used to predict whether or not the loan defaults.

Other stream of literature investigates either the impact of loan and borrowers' characteristics on default probability. Hu et al. (2019) find that borrowers' creditworthiness, loan amount, and loan term are the key factors to assess borrowers' default risk. Using data from the Lending Club, Emekter et al. (2015) find that loan characteristics such as credit grade, debt to income ratio, FICO score (credit scoring method in platform Lending Club), and revolving line utilization play an important role in loan default. Focusing on the characteristics of borrowers, empirical results from Lin, Li, and Zheng (2017) reveal that age, marital status, educational level, working years, company size, monthly payment, loan amount, debt to income ratio, and delinquency history play a significant role in loan defaults. Greiner and Wang (2010) find that economic status is the major determinants of the likelihood of funding and the interest rate should be paid by the borrower. Economic status consists of credit grade, debt to income ratio, verified bank account, homeowner, and previous successful loan. While there is abundant literature examine loan default in P2P lending markets, literature about interest rate setting mechanism are rather limited because this is an emerging issue in online P2P loans (Dietrich and Wernli 2016). Berger and Gleisner (2009) examine the effect of intermediation and characteristics of the transaction on the borrower rate by using data from Prosper.com. One of their main results shows that the use of an intermediary in the electronic marketplace significantly lowers borrowers' loan spread. Group affiliation *ceteris paribus* lowers the credit spread by 25 basis points. Using also data from Prosper.com, Collier et al. (2010) investigate the role of communities in the P2P lending platforms. The main result from their work is that borrowers from communities that provide high-quality behavioral signals are associated with a lower interest rate of the granted loan.

The role of communities or social network is also highlighted in some studies (Chen, Zhou, and Wan 2016; Freedman and Jin 2017). Dietrich and Wernli (2016) analyze the determinants of P2P loan interest rates using a unique dataset on loan contracts between borrowers and lenders from Switzerland. They find that interest rate on loan in P2P lending is significantly affected by loan-specific and macroeconomic factors. In addition, they also find some discriminations against borrowers as also highlighted by prior works (Barasinska and Schäfer 2014; Pope and Sydnor 2011).

3. Peer-To-Peer Lending in Indonesia: Development and Regulation

The development of technology has reached all sectors of the economy including financial intermediaries, and this phenomenon is more pronounced in the emerging economies like Indonesia. Several years ago, Indonesian people should go to the bank to obtain financial services such as opening bank account and transferring money, while now all of these activities could be performed directly from their smartphones. In the past, to perform transaction activities in the grocery store, people had to go to automated teller machine. However, digital fiat currency and e-wallet are widely used nowadays to perform transaction activities even in the traditional market, and this is more pronounced by the massive campaign of the central bank (Bank Indonesia) about promoting cashless society.

As the fourth most populous country in the world with total population more than 250 million, Indonesia have a great opportunity to support the development of fintech particularly P2P lending. Based on the data from the Indonesia Statistical Bureau (*Badan Pusat Statistik/BPS*), total internet users in Indonesia have reached 150 million in 2018 and it is predicted to grow 13% yearly. At the same time, more than 50 million micro and small and medium enterprises (MSME) in Indonesia do not have access to the bank (Ministry of Cooperative and Small and Medium Enterprise of Indonesia). Looking at the fact that 99% of all Indonesian business can be classified as MSME that contributes to 42% GDP with a total employment of 91 million (Shaban et al. 2014), therefore, Indonesian government suggests MSME to take advantage of P2P lending development to raise their capital or to expand their business.

Although P2P lending in Indonesia seems to have a bright prospect as mentioned earlier in the introduction, however, its development could be considered in its infancy. The formal regulation about P2P lending in Indonesia was issued by OJK in December 2016 through *Peraturan Otoritas Jasa Keuangan Nomor 77 Tahun 2016* (POJK 77–2016). The regulation is comprehensive as it covers all aspect in P2P lending. However, although the regulation is applicable for P2P lending users (lenders and borrowers), the main point of the regulation is intended to control operational aspects P2P lending platforms. For instance, regarding P2P lending platform ownership, it is mentioned that foreign ownership cannot exceed 85%. It is also mentioned that foreigners could subscribe to the platforms as lenders but not borrowers. Another important aspect of this regulation that should be taken into account is the minimum capital requirements for the platform to operate is IDR 2.5 billion to be licensed by OJK. Platforms are also not allowed to lend more than IDR 2 billion but there is no limitation of interest that should be borne by the borrowers. Previously, OJK expect that the allowed interest is maximum seven times of the benchmark (Bank Indonesia 7-Day Repo Rate) but it then annulled. The other main point from POJK 77–2016 is that the obligation for the platforms to create an escrow account (joint virtual account between borrowers and lenders). This means that platforms are not prohibited to “touch” the fund-flowing from the lenders to the borrowers (when the loan granted), and vice versa (when the borrowers payback their loan). The profits obtained by the platforms should be in the form of commission.

All in all, POJK 77–2016 is issued to provide bright future about the practice of fintech in Indonesia especially in P2P lending activities. In general, this formal regulation could be an instrument to protect the interests of consumers regarding the security of funds and data as well as national interests related to the prevention of money laundering and funding of terrorism. Ultimately, this regulation is also expected to promote national financial system stability.

4. Research Method

4.1. Sample Description

All of our data come from *Otoritas Jasa Keuangan* (Indonesia Financial Services Authority) as a fintech regulator Indonesia including P2P lending business. We use data of three P2P platform in Indonesia from the period of 2014–2018. These platforms are part of 99 platforms that has officially registered and monitored by OJK until January 2019. For the reason of data confidentiality, in this article we name these platforms as *Alpha*, *Beta*, and *Gamma*. The brief description of each platform is as follows (please see [Table 1](#) for the summary).

Alpha is one of the pioneer P2P lending platforms in Indonesia with total loan granted more than IDR 600 billion (\pm USD 42.4 million). Until the end of 2018, Alpha has served over 160,000 micro business and surprisingly it has less than 5% loan default. Focusing on the very small villages in Indonesia where most of the people do not have access to the banks, Alpha lend to micro businesses that need capital around IDR 3 million (\pm USD 200) to expand their business. Most of their borrowers are people who operate their business from their own home. To select the borrower candidate, Alpha develops credit scoring that combines and analyze borrowers' behavior, profile, and personality. For instance, grade A means that borrowers have a probability of payback their loan between 97.11% and 100%, grade B have 95–97% success probability and so on. Better grade means a lower probability of default. This credit grade is offered to the investors/lenders. To be an investor in Alpha, people could just register in its website and provide a fund IDR 3 million (\pm USD 200). This fund could be used to finance more than one business.

Beta is another platform that provides a marketplace for lenders and borrowers. In Beta, people only need IDR 1 million (\pm USD 70) to be an investor, smaller than Alpha. However, compared to Alpha, total fund disbursed to the borrowers has reached more than IDR 1 trillion (\pm USD 70.8 million). This is because different from Alpha, Beta's borrowers could propose amount up to IDR 2 billion (\pm USD 141,000). Therefore, it is different from Alpha that mainly focuses on the micro business. Beta categorize its financing into invoice financing, online seller financing, and employee financing. Invoice financing is a funding activity that is carried out by pledging an ongoing invoice as a source of loan payments by the borrower. Online seller financing is short-term funding provided to sellers in one of the e-commerce Beta partners. Employee financing is financing mode for those works in a company that has an agreement with Beta.

Using a jargon "borrowing from the smartphone," Gamma offers online fast and direct financing to the borrowers. Gamma claims that the money could come directly into borrowers' account in 24–48 h. Gamma

Table 1. Platform descriptions.

	Alpha	Beta	Gamma
Total granted loan ^a	IDR 600 billion (\pm USD 42.4 million)	IDR 1 trillion (\pm USD 70.8 million)	IDR 200 billion (\pm USD 14.1 million)
Loan amount to borrowers	\pm IDR 3 million (\pm USD 200)	Up to 2 billion (\pm USD 141,000)	Up to IDR 3 million (\pm USD 200)
Focus	Micro Business	Medium, Small, and Micro Business	Micro business or consumption
To be an investor	\pm IDR 3 million (\pm USD 200)	IDR 1 million (\pm USD 70)	Not available
P2P Lending marketplace	Yes	Yes	No

Notes: ^a Until November 2018

focuses on micro-financing with the amount up to IDR 3 million (\pm USD 200). Until November 2018, Gamma has financed its borrower with the total amount more than IDR 200 billion (\pm USD 14.1 million). Around 30% of Gamma's financing portfolio is used for SME, while other portions are used for education, health, and consumption.

4.2. Baseline Analysis

In this article, our main purpose is to investigate the determinants of loan interest rate and the probability of default the P2P lending platform. We construct two separate equations as follows.

$$\begin{aligned} RATE_i = & \alpha + \beta_1 AMOUNT_i + \beta_2 PERIOD_i + \beta_3 WOMAN_i + \beta_4 MARRIED_i + \beta_5 HOUSE_i \\ & + \beta_6 EDUCATION_i + \beta_7 INCOME_i + \beta_8 AGE_i + \varepsilon_i \end{aligned} \quad (1)$$

$$\begin{aligned} DEFAULT_i = & \alpha + \beta_1 RATE_i + \beta_2 AMOUNT_i + \beta_3 PERIOD_i + \beta_4 WOMAN_i + \beta_5 MARRIED_i \\ & + \beta_6 HOUSE_i + \beta_7 EDUCATION_i + \beta_8 INCOME_i + \beta_9 AGE_i + \varepsilon_i \end{aligned} \quad (2)$$

where i represents individual borrowers. The dependent variable is **RATE** and **DEFAULT**. The former is a rate charged to its borrowers in P2P platforms, while the latter is the status of the loan, whether it is successfully repaid by the borrowers or being default. Rate of loan is determined by the P2P online platform after examining all of the information from the borrowers. Therefore, each loan is rated with a grade that tries to capture the risk of default and thus investors (lenders) can make their choices (Serrano-Cinca, Gutiérrez-Nieto, and López-Palacios 2015). If the probability default of a proposed loan is high, the grade determined by the platform is low, and therefore the interest rate offered to the investors is high. Investigating loan rate and default status has been of academic interest in recent years (Dorfleitner et al. 2016; Wang et al. 2018).

AMOUNT is the amount of loan proposed by the borrower and accepted by the platform, in the logarithm form. Loan amount is one of the most important risk characteristics in P2P lending (Berger and Gleisner 2009) and widely investigated in prior studies. The larger amount in general results in a larger perceived default risk of the borrowers (Jin, Shang, and Ma 2019). P2P lenders may prefer to lend to the small amount rather than big amount because the lender is sensitive with the investment risk (Cai et al. 2016). The association between the loan amount and default risk, therefore, is predicted to be negative. **PERIOD** is the period of loan or number of days from the loan granted until the date of maturity (a day when the principal and all remaining interest is due to be paid) in the logarithm form. This is similar to maturity as in Dorfleitner et al. (2016) or loan term as in Han et al. (2018). A longer period of the loan could imply higher perceived risk, and it is avoided by the online lenders (Lee and Lee 2012). This is because the P2P lending platform is developing and changing rapidly and therefore lenders will prefer short investment to reduce risk. However, a longer period of a proposed loan could also show a promising and well-planned project from an entrepreneur. Lenders might opt to a loan with a long period since it could give them interest rate payment for a longer time. This argument is also strengthened by Han et al. (2018) who find that loan term is positively associated with a funding success.

Borrower characteristics are our focus in this article as prior works highlight that economic status and demography of the borrowers are determinants of interest rate or default probability in P2P lending (Greiner and Wang 2010; Xia, Liu, and Liu 2017). In this article, we focus on borrowers' gender (**WOMAN**), marital status (**MARRIED**), home ownership (**HOUSE**), degree of education (**EDUCATION**), monthly income (**INCOME**), and age (**AGE**). **WOMAN** is a dummy variable equals to 1 if the borrowers are female and zero for male. Pope and Sydnor (2011) find that the probability for women to obtain a loan from the P2P lending market is more than men. It is because women are considered more attractive to obtain a loan than men. Moreover, Jin et al. (2017) argue that beauty premium phenomenon does present in online P2P lending. Therefore, woman borrowers are expected to have a lower interest rate and lower default probability.

MARRIED is also a dummy variable equals to one if the borrowers are married. The marital status has also become researchers' focus recently (Chen, Huang, and Ye 2018; Han et al. 2018; Serrano-Cinca, Gutiérrez-Nieto, and López-Palacios 2015; Xia, Liu, and Liu 2017). This is because the behavior of the married and unmarried borrowers could be different. One might argue that married borrowers will have a lower probability of default because they are considered to be more financially stable. Conversely, it could also be argued that married borrowers will be financially constrained because the profit from those people's business also has to be used to feed their family.

EDUCATION could be a signal of the borrowers' quality (Cai et al. 2016) and could increase the probability of getting the loan funded (Chen, Huang, and Ye 2018). A negative sign from this variable could be expected as borrowers with higher education levels could obtain a fund with lower interest rate and could also have a lower probability of default, as also empirically found in Chen, Huang, and Ye (2018) and Dorfleitner et al. (2016). However, a person's success in a business is not always related to their formal degree. People with a higher degree might have lower business experience because most of their time is allocated for study. Those people indeed have low business experience.

Information about the borrowers' economic status is commonly used by lenders to evaluate borrowers' ability to repay a loan (Greiner and Wang 2010). Better economic status of the borrowers could reduce the interest rate of the borrower (Greiner and Wang 2010) because it increases the perceived trustworthiness of the borrowers. Economic status could be reflected in the monthly income (**INCOME**) and home ownership (**HOME**) of the borrowers. Home ownership could signal that a person is responsible and capable of handling loans such as mortgage (Berger and Gleisner 2009; Greiner and Wang 2010). Therefore, we expect that negative signs from **INCOME** and **HOUSE** since better income and home ownership will help borrowers to secure a better interest rate. Our prediction is also supported by work from Chen, Huang, and Ye (2018) that find a negative impact of home ownership on the loan interest rate.

AGE is the age of the borrowers. Prior study highlights that age plays a key role in determining loan success (Gonzalez and Loureiro 2014). We expect a negative association between age of loan applicant and the interest rate because age is a clear signal of competence (Gonzalez and Loureiro 2014). A borrower above 40 is perceived more competence and stable regarding their financial condition. This argument is also empirically supported by Han et al. (2018) who report a positive association between age and funding success. However, other research such as Pope and Sydnor (2011) highlight that market discriminates somewhat against the elderly. The lack of knowledge about information technology for older people could be a big barrier for them to compete in the current business situation especially in a developing country like Indonesia.

4.3. Further Analysis: A Regulatory Perspective

Another objective of this research is to examine the differences in the risk premium before and after the formal regulation for P2P lending established. Prior P2P lending literature focusing on regulation is very limited and lack of empirical approach (Fong 2015; Wang, Shen, and Huang 2016). To investigate this issue, we extend our analysis by using the following equations.

$$\begin{aligned}
 RATE_i = & \alpha + \beta_1 REG_POJK77_i + \beta_2 AMOUNT_i + \beta_3 REG_POJK77 * AMOUNT_i \\
 & + \beta_4 PERIOD_i + \beta_5 WOMAN_i + \beta_6 MARRIED_i + \beta_7 HOUSE_i + \beta_8 EDUCATION_i \\
 & + \beta_9 INCOME_i + \beta_{10} AGE_i + \varepsilon_{it}
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 DEFAULT_i = & \alpha + \beta_1 REG_POJK77_i + \beta_2 RATE_i + \beta_3 REG_POJK77 * RATE_i \\
 & + \beta_4 AMOUNT_i + \beta_5 PERIOD_i + \beta_6 WOMAN_i + \beta_7 MARRIED_i + \beta_8 HOUSE_i \\
 & + \beta_9 EDUCATION_i + \beta_{10} INCOME_i + \beta_{11} AGE_i + \varepsilon_{it}
 \end{aligned} \tag{4}$$

REG_POJK77 is a dummy variable equals to one if the loan is granted to the borrower after the introduction of the formal regulation by OJK (POJK77–2016) and zero otherwise. The impact of regulation on peer to peer lending is predicted to be lowered interest rate because of the monitoring effort of the financial regulator. This could expectedly minimize the opacity and enhance the transparency of the business. In addition, the regulation will also speed up the funding time because the lenders have more confidence to invest their money using the platform. In this further analysis, we also make interactions between regulation and some of our variable of interest: amount and interest. In Equation (3), we introduce *REG_POJK77*AMOUNT*. When the regulation applied in the Indonesian P2P lending market, the amount of loan proposed by the borrower is predicted to be higher than before the regulation issued because borrower will be more confident to ask more money using online platform. More borrower will use online platforms because it is faster than conventional ways (bank) and the platforms generally do not require any collateral. We also introduce the interaction variable *REG_POJK77*RATE* in Equation (4). It is expected that the existence of formal regulation will decrease the interest rate charged to the borrower and subsequently decrease the default probability.

4.4. Econometrics Approach

We use ordinary least squares (OLS) regression to estimate the coefficients in Equations (1) and (3) and logit regression to estimate Equations (2) and (4). For all estimations, we use robust standard errors to correct heteroscedasticity and autocorrelation problems. Even though our data range from 2014 to 2018, we opt to use OLS rather than panel data analysis. This is because our data structure is not panel, that is, each observation refers to each loan, and it also refers to each borrower. Moreover, our OLS approach is also similar to related prior works (Berger and Gleisner 2009; Chen, Huang, and Ye 2018; Dietrich and Wernli 2016; Freedman and Jin 2011, 2017; Iyer et al. 2015; Pope and Sydnor 2011).

5. Empirical Result

5.1. Descriptive Statistics

Table 3 presents the descriptive statistics of our sample. There are significant differences regarding the number of observations from three platforms. Alpha has more than 1 million observations that we can use in the analysis whereas Beta has only 6,951 observation and Gamma has 168,434 observations. Because of this discrepancy, in the regression analysis that we will present its result further, we do not combine the sample from three platforms. Instead, we will present them separately to see the differences from one platform to others. Another reason is that in Alpha there are no data about home ownership and education so that merging these sample is not possible. The definition of each variable, particularly how to measure, is described at the bottom of the table.

From more than 1 million observations in Alpha, we could see that the loan default in Alpha is very low, only 0.3%. Beta and Gamma have 5.2% and 11.6% loan default, respectively. These statistics suggest that the loan default of P2P lending business is considerably low. If we see the comparisons of loan rate from three platforms, Gamma which has the highest percentage of loan default also has the highest loan rate. Because Gamma focuses on short-period of lending, which is from 10 days to 90 days, its average yearly interest rate on loan reach 272%. In comparisons, Alpha and Beta have 28.8% and 20% yearly interest rate respectively, far from Gamma. Alpha and Gamma focus on a very small loan, ranges between IDR 0.5 million (\pm USD 35) to IDR 13 million (\pm USD 919) for Alpha and between IDR 1 million (\pm USD 70.8) to 8 million (\pm USD 565.7) for Gamma. Interestingly, it is the only Beta that focuses on both large and small loan. The maximum value of loan they give to the borrower is IDR 600 million (\pm USD 42,429) whereas the minimum value is IDR 2 million (\pm USD 141). Both Alpha and Gamma give their loan for approximately one-year maximum and 2 or 3 months minimum.

Now we turn to the characteristics of borrowers. All of the borrowers from Alpha are a woman (see variable *WOMAN*) and most of them are married (see variable *MARRIED*). This is different from

Table 2. Variable definitions.

Variable	Definitions and/or proxy	Related reference(s)
<i>DEFAULT</i>	The default status of the loan granted to the borrowers proxied by a dummy variable equals to 1 if the loan is default.	(Dorflleitner et al. 2016; Jiang et al. 2018; Nowak, Ross, and Yenchu 2018; Xu and Chau 2018, and many more)
<i>RATE</i>	The interest rate of loan granted to the borrowers (in decimal).	(Berger and Gleisner 2009; Chen, Huang, and Ye 2018; Collier et al. 2010; Dietrich and Wernli 2016)
<i>REG_POJK77</i>	Formal regulation issued by OJK in 2016 proxied by the dummy variable equals to one if it is 2016.	(Fong 2015; Wang, Shen, and Huang 2016).
<i>AMOUNT</i>	The amount of loan granted to the borrowers (in million IDR).	(Berger and Gleisner 2009; Cai et al. 2016; Jin, Shang, and Ma 2019)
<i>PERIOD</i>	The period of loan	(Dorflleitner and Oswald 2016; Han et al. 2018; Lee and Lee 2012)
<i>WOMAN</i>	Dummy variable equals to 1 if the borrower is woman	(Jin et al. 2017)
<i>MARRIED</i>	Dummy variable equals to 1 if the borrower is married	(Chen, Huang, and Ye 2018; Han et al. 2018; Serrano-Cinca, Gutiérrez-Nieto, and López-Palacios 2015; Xia, Liu, and Liu 2017)
<i>HOUSE</i>	Dummy variable equals to 1 if the borrower owns a house	(Berger and Gleisner 2009; Greiner and Wang 2010)
<i>EDUCATION</i>	The formal degree of education of borrower, ranges from 1 to 7 (1 = Kindergarten; 2 = Elementary School; 3 = Junior High School; 4 = Senior High School; 5 = Undergraduate Degree; 6 = Master Degree; 7 = Doctoral Degree).	(Chen, Huang, and Ye 2018; Dorflleitner et al. 2016)
<i>INCOME</i>	Monthly borrowers' income (in Million IDR)	(Berger and Gleisner 2009; Chen, Huang, and Ye 2018; Greiner and Wang 2010).
<i>AGE</i>	Borrowers' age (in years)	(Han et al. 2018; Pope and Sydnor 2011)

Notes: In the regressions, variable *AMOUNT*, *INCOME*, and *AGE* will be in the logarithm form.

Table 3. Descriptive statistics.

Variable	Platform = Alpha					Platform = Beta					Platform = Gamma				
	Obs	Mean	Std. dev.	Min	Max	Obs	Mean	Std. dev.	Min	Max	Obs	Mean	Std. dev.	Min	Max
<i>DEFAULT</i>	1,039,555	0.003	0.050	0	1	6,951	0.052	0.221	0	1	168,434	0.116	0.320	0	1
<i>LOAN_RATE</i>	1,039,555	0.288	0.003	0.192	0.384	6,951	0.200	0.056	0.14	0.3	168,434	2.729	0.720	0.14	3.65
<i>REG_POJK77</i>	1,039,555	0.835	0.371	0	1	6,951	0.941	0.235	0	1	168,434	0.916	0.278	0	1
<i>AMOUNT</i>	1,039,555	3.096	1.166	0.5	13	6,951	60.431	79.892	2	600	168,434	2.914	1.928	1	8
<i>PERIOD</i>	1,039,555	342.055	36.441	70	350	6,951	349.193	41.146	90	360	168,434	40.828	26.503	10	90
<i>WOMAN</i>	1,039,555	1	0	1	1	6,951	0.461	0.498	0	1	168,434	0.464	0.499	0	1
<i>MARRIED</i>	1,039,555	0.996	0.061	0	1	6,951	0.711	0.453	0	1	168,434	0.647	0.478	0	1
<i>HOUSE</i>						6,951	0.705	0.456	0	1	168,434	0.261	0.439	0	1
<i>EDUCATION</i>						6,917	4.639	0.811	3	6	168,434	4.267	1.738	1	7
<i>INCOME</i>	1,039,555	3.101	1.920	0.9	9	6,951	19.664	20.620	2.2	80	168,434	5.970	3.517	2.5	24
<i>AGE</i>	1,039,555	41.564	9.400	22	60	6,951	37.043	8.065	22	60	168,434	26.314	8.996	14	60

Note: This table describes the descriptive statistics of our sample. Our sample consists data from three P2P lending platforms in Indonesia, namely, Alpha, Beta, and Gamma (not the real name). Please see Table 2 for the description of variables.

Beta and Gamma who has approximately 50% woman borrowers that most of them are also married. We do not have any information about home ownership and education level for Alpha. However, as we could see in the table, most of the borrowers in Beta (70%) own a house but not for Gamma (26%). This is plausible because the amount given by Beta is considerably high compared to Alpha.

If we see from the borrowers' income, we may conclude that borrowers from Beta on average could be entrepreneurs with the average income almost IDR 20 million (\pm USD 1,414) from their business activities. In comparison, the mean of borrowers' income in Alpha and Gamma are IDR 3.1 (\pm USD 219) and IDR 5.9 million (\pm USD 417) respectively, possibly very small entrepreneurs or employees. The borrowers in average hold Undergraduate degree (Beta) and Senior High School degree (Gamma). Gamma is mostly used by young people, with the average age of borrowers 26 years old. This is different from Alpha and Beta that have borrowers in the age of 41 and 37 years old, respectively.

5.2. Loan Interest Rate and Borrower's Characteristics

We will start this section by explaining how borrower characteristics impact loan rate and loan default. From the result displayed in Table 4, we find strong evidence that the amount of loan in overall is negatively associated with the interest rate given by the platform to the borrowers. P2P lending platforms tend to give a higher rate for the smaller loan. This is because small business demanding for a small-scale loan through P2P platforms tend to have higher business risk than a medium or large enterprise. The coefficient of Gamma is also bigger than Alpha because the latter gives its loan on a daily basis with a higher interest rate than the former. This result is consistent with Cai et al. (2016) and Jin, Shang, and Ma (2019). A larger amount of loan is associated with a higher

Table 4. Loan rate and borrower characteristics.

	Alpha	Beta	Gamma
	(1)	(2)	(3)
<i>Log AMOUNT</i>	-0.00178*** (-58.45)	-0.000809 (-1.64)	-0.444*** (-147.28)
<i>Log PERIOD</i>	0.00280*** (59.70)	-0.0128*** (-3.91)	-0.455*** (-143.06)
<i>MARRIED</i>	-0.000205*** (-12.48)	-0.0169*** (-13.88)	0.00836*** (2.74)
<i>Log INCOME</i>	-0.00000718 (-1.26)	-0.0227*** (-31.12)	-0.00897*** (-2.93)
<i>Log AGE</i>	-0.0000961*** (-7.16)	0.0210*** (7.51)	-0.0408*** (-9.16)
<i>WOMAN</i>		0.00477*** (4.15)	-0.00377 (-1.50)
<i>HOUSE</i>		-0.0211*** (-17.47)	0.00365 (1.23)
<i>EDUCATION</i>		-0.0143*** (-18.78)	0.00180** (2.34)
<i>CONSTANT</i>	0.300*** (1378.39)	0.694*** (33.19)	11.00*** (181.97)
<i>N</i>	1,039,555	6,917	168,434
<i>R-sq.</i>	0.0388	0.392	0.501

Note: Please see Table 2 for variable descriptions. The dependent variable is the yearly rate of loan in P2P lending. Variable *WOMAN* in Alpha is dropped from the analysis because all of the borrowers is woman (woman = 1, man = 0). Variable *HOUSE* and *EDUCATION* are not available from Alpha. Robust t-statistics are in parentheses. ***, **, and * denote significance in 1%, 5%, and 10% levels, respectively.

perceived risk of borrowers. Lenders in Indonesia are also sensitive to investment risk so that they prefer to lend with a smaller amount.

We also observe from Table 4 that the loan period positively impacts loan rate for Alpha, implying that borrowers will be charged with a higher interest rate for a loan with a longer period. Consistent with Lee and Lee (2012), because P2P lending business is growing rapidly and may change in the future, lenders prefer to lend in a shorter period to minimize risk. However, different results are obtained from Beta and Gamma that shows a negative sign. This means that a longer period of the loan, lower interest rate. A plausible argument behind this is that lenders could see a longer loan period as a well-planned project so that they choose loans with a longer period than a shorter period. This argument is also consistent with Han et al. (2018).

We also find that gender matters on P2P lending rate especially for Beta. Woman tend to have a higher rate of interest compared to man. This result is different from prior works such as Jin et al. (2017) and Pope and Sydnor (2011) who find a positive effect of beauty premium on the funding success. Our different results could be because of the sample we use. In Indonesia, lenders and platforms might see that man is more experienced in a business or work. Since more than 80% of Indonesian population are Muslims, they have a view that it is the man that is obliged to work for their family while the woman is responsible for taking care their children and providing family's need in the home.

Marital status also matters in explaining interest rate given by the platform. It has a negative association for Alpha and Beta but a positive impact for Gamma. This different impact is not surprising because there are two arguments about this. On the one hand, married people could be more financially stable because wedding party and all of the things related to that is not cheap in the Muslim community as in Indonesia. On the other hand, married people have more responsibility because they have to provide all of the things for their spouse and children so that they are financially constrained.

Regarding the economic status of the borrowers, our result also consistent with previous studies (Berger and Gleisner 2009; Greiner and Wang 2010). People who have house given lower interest rate by Beta possibly because having house signals a responsibility and capability of handling loans such as a mortgage. Another view is that home owners could use their house as collateral when asking for a loan so that they are charged with the lower interest rate. In a similar vein, higher borrowers' income is also associated with the lower interest rate as we find for platform Beta and Gamma. This is because higher-income borrowers indeed have a higher probability of payment rather than smaller-income borrowers.

Last, we find two results regarding the impact of borrowers' age on the interest rate. For platform Alpha and Gamma, negative sign means that older borrowers are related to lower interest rate. This is consistent with Gonzalez and Loureiro (2014) who argue that age is a clear signal of borrowers' competence. However, for Beta, our positive and significant result support Pope and Sydnor (2011) who highlight that market discriminate older people.

To sum up, we find that the impact of borrowers' characteristics on the interest rate charged to them is different from one platform to others. This is because each platform has its own specific business model and strategy. For instance, Gamma serves young people (26 years old on average) that just start their job or a business. For this reason, the rate of interest given to them is very high (272% in average for a year) and the period of the loan is very short (10–90 days) because these young people are considered as risky borrowers who are lack of experience. For young people, if they are married, Gamma considers that their risk profile increases because they have more duties. It implies the positive and significant impact of variable *MARRIED* for Gamma. The result is different from what we find in Alpha and Beta who show the negative sign. Alpha and Beta's borrowers are 41 and 37 years old on average. When they are married, they are considered to be more mature and stable so that the interest rate charge to them are smaller. In this age, unmarried people are considered to be unmaturred in the Indonesian culture.

Table 5. Loan default and borrower characteristics.

	Alpha	Beta	Gamma
	(1)	(2)	(3)
<i>RATE</i>	31.93*** (26.56)	-0.866 (-0.83)	1.239*** (37.56)
<i>Log AMOUNT</i>	1.370*** (23.27)	0.486*** (9.08)	0.316*** (13.64)
<i>Log PERIOD</i>	-1.310*** (-6.62)	2.081* (1.86)	1.823*** (52.14)
<i>MARRIED</i>	0.771* (1.72)	-0.422*** (-3.07)	0.000920 (0.05)
<i>Log INCOME</i>	-1.016*** (-29.27)	0.562*** (6.15)	0.0295 (1.50)
<i>Log AGE</i>	0.293*** (3.47)	-0.455 (-1.29)	-0.215*** (-7.93)
<i>WOMAN</i>		2.620*** (11.87)	0.0479*** (3.01)
<i>HOUSE</i>		-0.204* (-1.80)	0.0369* (1.94)
<i>EDUCATION</i>		-0.213** (-2.07)	-0.0150*** (-3.03)
<i>CONSTANT</i>	-14.65*** (-9.91)	-32.61*** (-4.88)	-17.49*** (-31.81)
<i>N</i>	1,022,780	6,509	168,434

Note: Please see Table 2 for variable descriptions. The dependent variable is loan default (1 = default; 0 = not default). Variable *WOMAN* in Alpha is dropped from the analysis because all of the borrowers is woman (woman = 1, man = 0). Variable *HOUSE* and *EDUCATION* are not available from Alpha. Robust *t*-statistics are in parentheses. ***, **, and * denote significance in 1%, 5%, and 10% levels, respectively.

5.3. Loan Default and Borrower Characteristics

One of the most interesting parts from three platforms in this study is that their rate of default is low. As described earlier, all of the platforms have less than 15% default rate. This is interesting because, lenders accept or reject borrowers' proposal based on the hard and soft information uploaded on the website of the platform (Iyer et al. 2015). In other words, platforms might not take any direct traditional survey to the candidate prior accepting to publish their loan proposals in the platforms' marketplace. Instead, P2P platforms utilize big data, IT tools, and all online data to effectively assess borrowers' creditworthiness (Yan, Yu, and Zhao 2015).

Our results from the regression of loan default on the borrower characteristics are displayed in Table 5. The first finding we would like to discuss in this table is that loan interest rate positively associated with loan default. This evidence could be a suggestion for the platforms to be more careful about the rate of interest they charge to the borrowers as the higher loan amount is associated with the higher credit risk (Cai et al. 2016). If the rate is too high, the probability of default is high as well. Our finding confirms prior studies (Hu et al. 2019; Nowak, Ross, and Yencha 2018).

Next, we find a strong and positive relationship between the amount of loan granted and default status of the borrowers, consistent with Chen, Huang, and Ye (2018). This is reasonable because P2P lending mainly focuses on small business lending possibly with a high-risk profile of borrowers. The platform should focus on small business with small-scale loans rather than a large amount of loan. Loans with a longer period are positively associated with the default status especially in Beta and Gamma. This result is consistent with the assumption that a longer loan period is associated with the

higher perceived risk that should be borne by the lenders (Emekter et al. 2015; Lee and Lee 2012). However, for Alpha, the negative result occurred. This might be because that Alpha focus on microlending with the loan granted approximately IDR 3 million (\pm USD 200) in average and this amount are disclosed clearly via the website of Alpha. Longer period of loan indeed will ease the repayment for the borrowers and therefore the default could be decreased. Another reason is that the positive sign could suggest investors' optimism about the performance of Alpha (recall that Alpha have less than 1% loan default) so that longer period of loan does not matter for them.

Table 5 also shows that woman borrowers in Beta and Gamma have a higher probability of default than men. It strengthens our explanation in the section before that woman in Indonesia are possibly less experienced (in managing money and business) compared to the man. Regarding marriage status, married borrowers significantly reduce the probability of loan default, especially for Beta. This platform focuses on a large amount of loan. It, therefore, suggests that married borrowers are more able to deal with large scale of the loan. When the loan amount is low as in Alpha, married borrowers strengthen the probability of loan default. Borrowers who own a house are associated with lower default probability especially in the case of Beta. Since Beta also focus on a large amount of loan, home ownership could be a signal for the lenders that borrowers are capable of managing their loan repayments. For Gamma, a positive sign means that borrowers are in the emergency and looking for fast and simple funding (Gamma's loan characteristics).

We also find in Table 5 that borrowers having a higher degree of education significantly reduce the probability of loan default. This is not surprising because education is a signal of borrowers' quality (Cai et al. 2016) and the similar results have been found in some prior works (Chen, Huang, and Ye 2018; Dorfleitner et al. 2016).

The impact of borrowers' income on loan default is different between Alpha and Beta. The impact is negative for Alpha, meaning that lower loan default is associated with borrowers with higher monthly income. However, for Beta, positive sign implies that high-income borrowers are more exposed to loan default. If we also link this evidence with the business model of each platform, we could get an answer to the different results. Compared to Beta with the average amount of loan IDR 60 million (\pm USD 4,242), Alpha is only IDR 3 million (\pm USD 200). A smaller amount of loan is usually for very small business with a very high risk operated by the new entrepreneurs. In this case, an entrepreneur with a stable and high income would be better because it could mitigate the default risk. However, in the case of Beta, high-income borrowers would tend to borrow a higher amount of loan compared to low-income borrowers. Consequently, higher income-borrowers tend to have higher loan default, as shown by a positive sign from variable *INCOME* in Table 3.

We also find the different results of the variable *AGE*. This variable shows a positive sign for Alpha and a negative sign for Gamma. Similar to what we have explained in the previous section, the mean of age of borrowers in Alpha is very different. In average, borrowers in Alpha is 41 years old while in Gamma is 26 years old. For Gamma, older borrowers are associated with lower default probability because this platform focuses on young entrepreneurs or people who just started their career. Older people will have a more stable income and financial condition. This result contradicts with Alpha showing that older borrowers will have higher loan default probability. Recall that all of the Alpha's borrowers are a woman. When they are getting old, they might need more money to fulfill their want.

5.4. The Impact of Regulation Change

Table 6 shows how regulation (*REG_POJK77*) impacts borrowers' interest rate and default risk in P2P lending. We also find that the impact is different between platforms. For Alpha and Gamma, the impact is positive but for Beta, the impact is negative. The positive impact implies that the introduction of formal regulation by OJK in the late of 2016 significantly increases the loan rate of P2P platforms. This might be not in line with the expectation of OJK that is to increase

Table 6. Loan rate, regulation, and borrower characteristics.

	Alpha	Beta	Gamma
	(1)	(2)	(3)
<i>REG_POJK77</i>	0.0348*** (45.00)	-0.128*** (-3.38)	3.278*** (12.48)
<i>Log AMOUNT</i>	-0.000242*** (-13.03)	-0.00659*** (-3.06)	-0.240*** (-13.61)
<i>REG_POJK77</i> × <i>Log AMOUNT</i>	-0.00250*** (-48.58)	0.00607*** (2.80)	-0.215*** (-12.06)
<i>Log PERIOD</i>	0.00442*** (58.63)	-0.0118*** (-3.52)	-0.448*** (-140.05)
<i>MARRIED</i>	-0.000171*** (-9.70)	-0.0169*** (-13.90)	0.00838*** (2.75)
<i>Log INCOME</i>	-0.0000387*** (-6.68)	-0.0226*** (-30.71)	-0.00896*** (-2.93)
<i>Log AGE</i>	-0.000119*** (-8.84)	0.0204*** (7.26)	-0.0411*** (-9.23)
<i>WOMAN</i>		0.00461*** (4.00)	-0.00395 (-1.57)
<i>HOUSE</i>		-0.0209*** (-17.18)	0.00365 (1.23)
<i>EDUCATION</i>		-0.0144*** (-18.88)	0.00180** (2.34)
<i>CONSTANT</i>	0.269*** (526.49)	0.789*** (20.63)	7.986*** (30.23)
<i>N</i>	1,039,555	6,917	168,434
<i>R-sq.</i>	0.0491	0.393	0.501

Notes: Please see Table 2 for variable descriptions. The dependent variable is the yearly rate of loan in P2P lending. Variable *WOMAN* in Alpha is dropped from the analysis because all of the borrowers is woman (woman = 1, man = 0). Variable *HOUSE* and *EDUCATION* are not available from Alpha. Robust *t*-statistics are in parentheses. ***, **, and * denote significance in 1%, 5%, and 10% levels, respectively.

financial inclusion. OJK expected that after the introduction of the formal regulations, unbanked people, and SME could have access to the financial products. However, this evidence is not without reason. Following this formal regulation, the demand on the P2P lending significantly increase. The shortfall of supply drives the increase in borrowers’ interest rate. Moreover, in the POJK 77-2016, there is no specific regulation about the maximum (or minimum) interest rate charged to borrowers. This makes platforms have their privilege to set their interest rate based on the ratings they develop. OJK argued that limiting the interest rate is not necessary because P2P platforms are mushrooming now. Competition between platforms will then determine the market acceptable interest rate.

Recall that Beta has a distinct characteristic than Alpha and Gamma. In Beta, candidates could borrow money up to 2 billion (± USD 141,000) while in Alpha and Gamma it is limited to about IDR 3 million (± USD 200). Beta’s focus not only on micro business but also small and even medium-sized business. If we look at this, in general, the introduction of the regulation has successfully decreased the risk premium especially substantially to the increase of the firm’s size. Another explanation of the negative sign of *REG_POJK77* from platform Beta could stem from the competition between platforms. After the formal regulation introduced, there are more P2P platforms introduced and monitored by OJK, so that the platform offered competitive interest rate to attract borrower candidates.

Table 7. Loan default, regulation, and borrower characteristics.

	Alpha	Beta	Gamma
	(1)	(2)	(3)
<i>RATE</i>	-117.4*** (-2.89)	-142.3*** (-6.11)	1.007*** (5.69)
<i>REG_POJK77</i>	-41.75*** (-3.56)	-23.68*** (-6.31)	0.534 (0.95)
<i>RATE</i> × <i>REG_POJK77</i>	151.7*** (3.73)	143.9*** (6.18)	0.244 (1.35)
<i>Log AMOUNT</i>	1.369*** (23.28)	0.512*** (9.52)	0.319*** (13.79)
<i>Log PERIOD</i>	-1.308*** (-6.61)	2.263** (2.05)	1.834*** (51.26)
<i>MARRIED</i>	0.771* (1.72)	-0.334** (-2.44)	0.000942 (0.05)
<i>Log INCOME</i>	-1.017*** (-29.28)	0.655*** (6.85)	0.0294 (1.50)
<i>Log AGE</i>	0.294*** (3.49)	-0.498 (-1.45)	-0.214*** (-7.90)
<i>WOMAN</i>		2.394*** (12.31)	0.0479*** (3.01)
<i>HOUSE</i>		-0.185* (-1.65)	0.0367* (1.93)
<i>EDUCATION</i>		-0.107 (-1.00)	-0.0150*** (-3.03)
<i>CONSTANT</i>	26.41** (2.24)	-12.61*** (-3.30)	-16.86*** (-22.69)
<i>N</i>	1,022,780	6,917	168,434

Notes: Please see Table 2 for variable descriptions. The dependent variable is loan default (1 = default; 0 = not default). Variable *WOMAN* in Alpha is dropped from the analysis because all of the borrowers is woman (woman = 1, man = 0). Variable *HOUSE* and *EDUCATION* are not available from Alpha. Robust *t*-statistics are in parentheses. ***, **, and * denote significance in 1%, 5%, and 10% levels, respectively.

Table 7 demonstrates the links between loan default and regulation. The negative sign of *REG_POJK77* suggests that the introduction of formal regulation decreases loan default. The positive signs from the interaction means that the formal regulation could significantly decrease the negative impact of loan rate on loan default. It means that in the formally regulated market of P2P lending, platforms have the privilege to set their interest rate, and the negative effect of high-interest rate is diminished by the existence of regulation. For instance, the borrower candidate could think that it does not matter to borrow money with a high amount and high-interest rate. This view could jeopardize the stability of the borrower as well as the lender and platform. However, the regulation offset this negative impact so that the borrower candidate could have more confidence to borrow money through P2P platforms.

6. Conclusion

Financial technology, particularly P2P lending, has been growing significantly in Indonesia over the last few years. The channeled loans have been more than IDR 25 trillion (approx. USD 1.7 million). Until February 2019, P2P lending business in Indonesia has served around 5 million borrowers and

involving around 267,000 lenders. Since P2P lending platforms in general target MSME, the development of P2P lending activities in Indonesia could help the government's target to accelerate the level of financial inclusion.

In addition, there are some issues to deal particularly with regard to the riskiness of P2P lending. Although the amount of channeled loan increase dramatically after the introduction of the formal regulation, OJK reported that the non-performing loan also increase, from 0.99% in 2017 to 1.89% in 2018. In an empirical study, we find that the riskiness level of P2P lending in Indonesia is still high as reflected by high-interest rate. We also confirm that loan-specific factors and borrowers-specific characteristics play an important role in the determination of loan rate and default status of online direct lending in the context of Indonesia. Furthermore, because each P2P lending platform in Indonesia has a specific characteristic (e.g., each platform has a specific business model and target), we obtain mixed findings. There is a significant difference regarding the determinant of loan rate and default status between each platform. In addition, my empirical result also shows that following the formal regulation on P2P lending in 2016, the number of borrowers increases significantly much more than the number of lenders. The shortfall of supply then drives the increase of loan rate especially for platforms serving borrower with a small-sized loan.

Those findings have some policy implications. First, to avoid predatory competition between P2P lending and traditional financial institutions, the possibility of linkage between financial institutions and P2P platforms has to be considered by the government and financial authority. Second, the high risk of P2P lending indicates that this lending has a problem of asymmetric information, as highlighted in the literature. Therefore, it is necessary to ensure consumer protection and business transparency both for the borrowers and lenders. Third, more reliable and standardized reporting of P2P lending platforms to the financial authority should be imposed, as a tool to enhance the supervision on the P2P lending industry which can attract a higher amount of loanable fund in the industry and therefore lowering the cost of borrowing from P2P platforms. Fourth, extensive monitoring from the OJK should be imposed in the P2P lending industry, particularly for illegal P2P platform. Until 2019, there are 803 fintech business in Indonesia that has been banned by OJK, implying that there is a big threat in this industry that could harm financial stability.

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