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PEER-TO-PEER LENDING (P2P) AS DISRUPTIVE, BUT COMPLEMENTARY IN COVID-19 EXOGENOUS SHOCK

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Abstract. The purpose of this study is to examine the effect of P2P lending on bank credit in each type/segment of banking credit consisting of working capital credit, investment credit, and consumer credit in the period before and during the occurrence of the Covid-19 exogenous shock. Examining the effect of P2P lending on various types of bank loans is important because there is no conclusive evidence of whether P2P lending substitutes or complements various conventional bank loans. The Covid-19 pandemic impairs the income of many people and accelerates the use of digital technology in most daily activities including banking. Due to economic contraction during the outbreak, the government requires banks to relax the loan covenants. Therefore, P2P lending that provides flexibility might complement bank loans during the Covid-19 pandemic. The test in this study uses panel regression and is carried out by separating the period before (July 2019–March 2020), and during (July 2020–March 2021) the Covid-19 pandemic. The results show that P2P lending was disruptive for bank loans before the pandemic and turned to be complementary during the pandemic, it might be due to P2P lending flexibility complementing the bank credit relaxation during the pandemic.

Keywords: P2P lending, banking, FinTech, disruptive innovation, exogenous shock, Covid-19, substitution, complement.

JEL Classification: G21, G23, O33.

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1. Introduction

The financial industry plays an important role in the community for individuals, businesses, and also for the development of the country's economy. Digitalisation in the financial sector is entering a new chapter in financial services due to the emergence of start-up companies based on financial technology (FinTech). New business models and the use of technology provide financial innovations that become financial solutions for users of financial services (Gomber et al., 2017). FinTech can meet the needs of efficient financial services in regulation, not limited by region and time, easy to use, and low cost (Gomber et al., 2017; Liu et al., 2020). The presence of FinTech in the financial industry encourages innovation that will transform the overall financial industry landscape.

Various kinds of innovative services from FinTech-based business models have emerged gradually. FinTech in the financing area is developing as an innovative end-to-end financing model without the need for the involvement of banking intermediation (Zhou et al., 2019). The innovative form of lending offered by FinTech is often referred to as marketplace lending, which means that potential borrowers seeking a loan can apply through P2P platforms on the internet, and these platforms assess borrowers and categorise them according to their risk profile (Stern et al., 2017). FinTech-based P2P platforms provide a new paradigm and business model in a different financing area from traditional financing or banking institutions. P2P lending platforms are growing significantly in developing countries, as the elimination of financial intermediation functions or financial institutions can provide cheaper, more flexible, and faster loan approval services than traditional lending or banking institutions (Ma et al., 2018; Stern et al., 2017).

P2P lending is also growing rapidly in Indonesia as shown by the accumulation of P2P loans of Rp 22.67 trillion in December 2018 to Rp 155.9 trillion in December 2020, or around 587.69% (Otoritas Jasa Keuangan [OJK], 2020b). The rapid growth of P2P lending can pose a challenge for bank lending, while bank credit is a very important element for the development of state finances and

affects economic growth (Dang, 2019; Miyajima, 2020). In addition, the volume and growth rate of bank credit is also a major concern for bank managers, because it is one of the measurements in banking management performance (Dang, 2019). The importance of bank credit for economic growth and banking management causes related parties in the financial industry to be aware and continuously review potential threats to banking credit, such as the disruptive threat of P2P lending platforms.

Previous studies on the influence of P2P platforms on the banking sector have shown mixed results. Several studies have shown that P2P lending does not affect bank credit because the platforms tend to serve riskier borrowers with no collateral and areas that are less accessible to banks (Jagtiani & Lemieux, 2018; Kohardinata et al., 2020a; Thakor, 2020), thus, a P2P platform is not a competitor that interferes with the main banking market. Other studies have shown that the P2P platform is a complement to the banking sector because it uses idle money to serve a niche market such that the platform does not reach a size to compete with the banking sector; this is because some banks are also starting to learn from P2P platforms to use information technology and big data, and banking can also collaborate with P2P platforms (Jiang et al., 2018; Tang, 2019; Zalan & Toufaily, 2017; Zhang et al., 2019). Other studies stated that the P2P platform is a substitute for the banking sector because banking is still stricter and more careful, thus, banking customers will switch to using the P2P platforms (Phan et al., 2019; Zhang et al., 2019). A P2P platform is in a better position than banking because the existence of FinTech is still less regulated (Zalan & Toufaily, 2017). Statements from previous studies showed that P2P loans can potentially be complementary or substitute for bank credit or have no effect on bank credit.

Other previous studies have shown that the effect of P2P lending on bank credit can shift from time to time. Research by Zhang et al. (2019) showed that P2P loan has a positive effect on domestic bank loan when the P2P loan balances are small, while in the next phase when P2P loan balances are larger, P2P loans negatively affect domestic bank loan balance. On the other hand, research from Kohardinata et al. (2020b) showed a shift in the influence of P2P lending on rural bank credit growth, from a negative effect (substitution) to a positive effect (complement). The developing state of the P2P platform and its dynamic movement in the financial market result in the potential for a shift in influence from complement to substitution or vice versa. The impact of P2P lending on the banking sector is still unclear, so it is very important to carry out continuous exploration of this topic, considering that the banking sector is an important sector for business and the development of the country.

This study examined several tests, which is a novelty in this study, and which are expected to be able to add insight and fill in the gaps from previous studies. In the first test, the researcher examined the effect of P2P lending on several types of bank credit before the Covid-19 exogenous shock. In the second study, the researcher expanded the analysis by examining the effect of P2P lending on various types of banking credit during the Covid-19 exogenous shock.

The banking credit segment in Indonesia consists of three segments, namely working capital loans, investment loans and consumer loans. The working capital loan is a short-term loan granted to finance the working capital needs of companies; an investment loan is a medium and long-term loan granted to finance a new project or an expansion project of a company; Consumer credit is a loan used for consumption/consumptive purposes. Table 1, specifically in column 5, rows a and d show that the average working capital loan of banks from 2017–2020 dominates lending, with total working capital loans of 2,444,300 billion or the proportion of working capital loans of 46.30% of total loans. The influence of P2P loans on bank credit has the potential to be different for each banking credit segment and has the potential to be different during the Covid-19 exogenous shock.

Testing the effect of P2P lending on bank loans is an important topic to study. The researcher used the disruptive innovation theory approach and the consumer theory approach to understand the importance of this study. In theory, disruptive innovation enters the competition through the neglected market or the low-end market of the incumbent, which then, at the next stage, entrants enter the main market of the incumbent (Anagnostopoulos, 2018; Christensen, 1997; Christensen et al., 2015). Consumer theory provides another alternative that services or products provided by entrants can be complementary if these services or products

Table 1. Total and proportion of bank loan by type (segment) of bank loan (source: Otoritas Jasa Keuangan, 2018, 2020a)

Total bank loan by type of loan (Billion IDR)					
Type of loan	2017 (1)	2018 (2)	2019 (3)	2020 (4)	Average (5)
Working capital (a)	2,222,809	2,512,476	2,576,497	2,465,419	2,444,300
Investment (b)	1,179,761	1,308,747	1,481,226	1,468,687	1,359,605
Consumer (c)	1,335,402	1,473,659	1,559,269	1,547,454	1,478,946
The proportion of bank credit by type compared to total loan (Percentage)					
Working capital (d)	46.91	47.45	45.87	44.98	46.30%
Investment (e)	24.90	24.72	26.37	26.79	25.70%
Consumer (f)	28.19	27.83	27.76	28.23	28.00%

can be used together with previous products (Aaker & Keller, 1990; Levin & Milgrom, 2004); on the other hand, new services or products from entrant companies can be substitutes if they can replace old products (Aaker & Keller, 1990; Phan et al., 2019). This study needs to be carried out because the disruptive effect occurs if P2P lending disrupts the main banking market, namely the working capital credit market (Table 1). On the other hand, P2P lending is not disruptive if it is still outside the main segment or serves a market that is not served by banks. In addition, this test is important because P2P loans can also be used as a substitute for a segment in the bank loan.

The examination of the effect of P2P lending on banking loans in this research is further developed by including the Covid-19 exogenous shock situation. Various types of shocks can push technological adoption in unexpected ways and have the potential for long-term change in the economy and society (Fu & Mishra, 2022). Some shocks are "black swans"; events so rare or shocking that they are impossible or nearly impossible to predict (Brown & Kline, 2020; Kuckertz et al., 2020). In addition, exogenous shocks or black swans can destroy companies and industries due to the magnitude of their destruction (Brown & Kline, 2020). Exogenous shocks that cannot or are difficult to predict allow for uncertainty about the effect of P2P lending on each banking loan segment. P2P loans have the potential to be complementary in one segment or substitute in another during the Covid-19 exogenous shock, which limits people's movement, or a lockdown occurs.

At this point, the following research questions seem relevant for this study: Which types/segments of banking loan were significantly affected by P2P lending before the Covid-19 exogenous shock? Which types/segments of banking credit were significantly affected by P2P lending during the Covid-19 exogenous shock? To the knowledge of the researcher, there has been no research that tested the effect of P2P lending on bank loans in each type or segment of banking loan, and there has been no research that has tested the effect of P2P lending on banking loans based on the type or segment of banking loan at the time of the Covid-19 exogenous shock.

The results of this study indicate that P2P lending has a negative or disruptive effect on working capital loans before the onset of Covid-19; at the time of Covid-19, P2P loans had a positive or complementary effect on working capital and consumer loans. To arrive at these results, this research is structured as follows: After the introduction, the first part discusses the literature review that supports this research. The second part presents the research methods and data used in this study. The third part discusses the results of the research and discussion. The final section presents the conclusions of this study, limitations, and future research.

2. Literature review

This session describes the literature used to understand the effect of P2P lending on banking loans by type of banking, as well as in conditions before and during the Covid-19 shock. The literature review is divided into three parts, namely explanation of financial technology (FinTech) and peer-to-peer lending (P2P), disruptive innovation theory and consumer theory, and Covid-19 exogenous shock.

2.1. Financial Technology (FinTech) and Peer-to-Peer Lending (P2P)

FinTech comes from the words finance and technology, as the name suggests, is a combination of finance and technology (Goldstein et al., 2019; Gomber et al., 2017). FinTech is different from traditional electronic financial technology (e.g.: E-banking), the new role of information technology in FinTech is not as an effective facilitator or enabler in providing financial services like traditional electronic technology, but as an innovator that disrupts or replaces existing value chain channels (Ryu, 2018). The business models that use FinTech consist of payment, wealth management, crowdfunding lending business model, capital market, and insurance services (Lee & Shin, 2018; Liu et al., 2020). FinTech in this research is focused on the loan business model, namely peer-to-peer (P2P) lending, which has the potential to affect bank loans.

A P2P platform acts as an intermediary to be able to allocate capital directly between borrowers and lenders without involving banks or financial institutions (Wang et al., 2021; Zhou et al., 2019). P2P platforms are easy to accept and fast-growing in society, especially in developing countries, because they provide many benefits for borrowers and lenders. FinTech innovations can provide benefits such as accelerating lending decisions by utilising big data technology, artificial intelligence/machine learning algorithms, and alternative online data sources (Jagtiani & John, 2018; Lee & Shin, 2018); the operating costs of P2P platforms are also lower than traditional financial institutions (Lee & Shin, 2018). Therefore, FinTech-based P2P lending can provide a new mechanism for debtors to meet their needs, thus, the convenience provided by the P2P platform has the potential to affect the banking business.

2.2. Disruptive innovation theory and consumer theory

FinTech, through utilising information technology, provides a new paradigm that encourages innovation in the financial sector. FinTech is touted as a game-changer and is a disruptive innovation that can shake up traditional financial markets (Lee & Shin, 2018), including banking. Disruptive innovation is often understood by academics and practitioners as a condition in which industries experience shock, or established companies that were previously successful but are now collapsing (Christensen et al., 2015). Disruption should be understood as a process, hence, the term disruptive innovation is not appropriate when it is only used to refer to a product or service, but rather, disruption is a continuous evolution of a product or service (Christensen, 1997; Christensen et al., 2015). Disruption describes the process

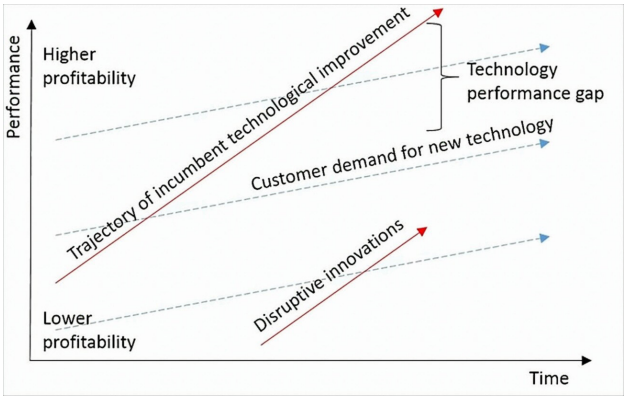

Figure 1. Model of disruptive innovation (Christensen et al., 2018)

of evolution of a product of entrants with fewer resources, but which can compete with incumbents.

The disruptive innovation process (Christensen et al., 2018) consists of three main components, which are: first, high-performance technology advances exceed customer demands, such that incumbents serve their customers too much by providing products with advanced features that exceed the needs of customers; This leaves a gap in the lower part of the market between the needs of customers and the performance of the technology provided by the company, hence this gap opens the way for entrants to enter (Figure 1). Second, disruptive innovation is introduced as products with inferior performance compared to products from the incumbent in the early stage, but entrants offer a new mix of attributes that attracts groups of customers who are in the lower market, often referred to as "entrants", on a disruptive trajectory. Third, existing customers and established business models limit the incumbents to invest in disruptive innovations. Incumbents are often not motivated to develop disruptive innovations that offer lower margins, smaller market share, and inferior products and services. Disruption occurs when a disruptive innovation reaches a performance level that is acceptable and considered good enough by the main market, and customers begin to switch to using the new technology and innovation (Montgomery et al., 2018).

Consumer theory states that new services or products provided by entrants can be complementary or substitutes for existing companies. Emerging companies (such as P2P platforms) can be complementary to incumbents when new products provided by entrants can be used in conjunction with existing products to meet specific needs (Aaker & Keller, 1990; Levin & Milgrom, 2004). On the contrary, products provided by entrant companies become substitutes for existing companies when customers perceive the new products from the entrants as being able to replace existing products (Aaker & Keller, 1990; Phan et al., 2019). Consumer theory suggests another possibility, that peer-to-peer platforms could act as a complement if the financial technology used is useful to complement existing banking services, on the other hand, P2P can act as a substitute if it replaces the position of banking to serve similar needs.

Disruption of the P2P platform occurs when P2P lending has eroded or become a substitute for the main banking market as incumbents. Disruption moves quickly, entrants or start-ups challenge and replace the incumbent every few years (Christensen et al., 2018). The fast movement of P2P start-up companies can also be seen from the research results by Zhang et al. (2019) which shows that, during the period January 2014 to April 2016, there was a shift from P2P loan balances that used to have a positive effect to a negative effect on domestic bank loan balance in just under three years. P2P lending in Indonesia started legally operating around 2016 since the emergence of the Financial Services Authority regulation number 77/POJK.01/2016 about information technology-based lending and borrowing services. The development of P2P in Indonesia over the past five years from the end of 2016 until 2021 has allowed P2P lending to be disruptive for banking loans or disrupt the main market segment of banking namely working capital loan, which accounts for 46.30% of the average total banking lending from 2017–2020. Therefore, the hypothesis used by the researcher to examine the effect of P2P lending on bank loans before the occurrence of the Covid-19 exogenous event is:

H1: P2P lending has a negative effect on the main segment of bank loans.

2.3. Covid-19 exogenous shock

The Covid-19 virus is labelled a "viral epidemic", which includes epidemics or pandemics that are more serious than mild flu illnesses (Brown & Kline, 2020). The Covid-19 virus is believed to have originated from China, which was first reported in December 2019 in China's Wuhan Province, which then spread rapidly to other countries. Covid-19 was first discovered in Indonesia in March 2020 and persisted throughout 2021. The Covid-19 pandemic is an exogenous shock because it has drastic implications for companies whose countries are affected by lockdowns and contact restrictions (Kuckertz et al., 2020; Soluk et al., 2021); the easing of restrictions and lockdowns carried out by countries also gave rise to a follow-up Covid-19 exogenous shock (Chandler et al., 2021).

The spread of the Covid-19 pandemic and the government's lockdown policies have increasingly encouraged increased adoption of financial applications; "Big tech" and FinTech start-ups can accelerate the absorption of digital services beyond traditional incumbents (Fu & Mishra, 2022). The Covid-19 outbreak has led to a decrease in the use of cash transactions and an increase in direct contactless transactions; transactions using mobiles help slow down the spread of the Covid-19 virus and ensure public health is maintained (Hasan et al., 2021). The Covid-19 exogenous shock provides a good opportunity for FinTech-based P2P start-up companies to develop rapidly; P2P platforms can serve the public's lending needs without needing to meet face-to-face or only using an online P2P platform intermediation facility.

The increasing adoption of FinTech or P2P platforms during the Covid-19 pandemic raises the possibility that P2P loans can be substitutes for traditional banking intermediation functions or become complementary to assisting banks in channelling credit. The exogenous shock of Covid-19 caused many borrowers to have little access to credit due to credit allotments or restrictions by traditional banks, so borrowers used online loan applications to meet credit requirements (Fu & Mishra, 2022; Tang, 2019; Thakor, 2020). The growth of the P2P platform during the Covid-19 period is supported using FinTech on a P2P platform, which can facilitate the assessment and distribution of loans without the need to meet face-to-face, so that the platform is a solution for society to obtain and distribute funds during restrictions on community activities during the Covid-19 pandemic. The use of P2P loan applications, if adopted more as latter type applications, can imply consequences for financial stability and further increases competition between FinTech-based lenders (P2P platforms) and traditional banks (Fu & Mishra, 2022). Testing in the exogenous shock situation to predict the effect of P2P lending on bank loans based on each type/segment of bank credit is not easy. However, based on the arguments that have been presented previously, the researcher adopts the hypothesis:

H2: P2P lending has a significant and negative effect on each banking loan segment in the exogenous shock situation of Covid-19.

3. Research methodology and data

The following part discusses the research methodology and the data used in this study. The tests carried out in this study used a panel data regression approach, the data period used for testing before the Covid-19 pandemic exogenous shock is from July 2019 to March 2020, and the data period used during the Covid-9 pandemic exogenous shock is from July 2020 to March 2021. The research models used in this study consist of:

$$\Delta WC = \alpha + \beta 1\ \Delta P2Pit + \beta 2\ \Delta DEPit + \beta 3\ \Delta NBit + \beta 4\ \Delta GDPit + \varepsilon t; \quad (1)$$

$$\Delta INV = \alpha + \beta 1\ \Delta P2Pit + \beta 2\ \Delta DEPit + \beta 3\ \Delta NBit + \beta 4\ \Delta GDPit + \varepsilon t; \quad (2)$$

$$\Delta CONS = \alpha + \beta 1\ \Delta P2Pit + \beta 2\ \Delta DEPit + \beta 3\ \Delta NBit + \beta 4\ \Delta GDPit + \varepsilon t. \quad (3)$$

Detailed descriptions of the research models are presented in Table 2; the dependent variables consisted of banking working capital loan (WC), investment loan (INV), and consumer loan (CONS). The independent variable P2P (P2P) used in this study is the accumulation of P2P loans. The control variables used in this study comprised banking deposits consisting of current accounts, savings, and time deposits (DEP), the number of bank offices (NB), and gross domestic product (GDP) in each province. The test in this study used growth because estimates based on growth can capture continuous changes better and reduce the effect of noise that causes bias in coefficients caused by invariant omitted variables bias (Chauhan & Kumar, 2019; Doan et al., 2015; Nguyen et al., 2017).

Table 2. Variable and measurement

Variables	Measurements
Dependent Variables	
Banking working capital loan (ΔWC)	% Monthly growth of working capital loan in each province
Banking investment loan (ΔINV)	% Monthly growth of investment in each province
Banking consumer loan (ΔCONS)	% Monthly growth of consumer loan in each province
Independent Variable	
P2P loans (ΔP2P)	% Monthly growth of accumulated P2P loans (real growth) in each province
Control Variables	
Bank deposits (ΔDEP)	% Monthly growth of bank deposits (current accounts, savings, and time deposits) in each province
Number of bank offices (NB)	Number of bank offices (Ln Number of Bank Offices) in each province
Gross domestic product (ΔGDP)	% Monthly growth of the gross domestic product in each province
Number of the province (i)	
Number of the month (t)	

This study uses data from 33 provinces in Indonesia from July 2019 to March 2020, and data from July 2020 to March 2021; The 33 provinces in Indonesia consist of: Yogyakarta, Jakarta, West Java, Banten, East Java, Central Java, Bali, Bengkulu, North Sumatra, West Sumatra, South Sumatra, West Papua, Papua, Lampung, Riau, Riau Islands, Bangka Belitung, Central Sulawesi, North Sulawesi, Southeast Sulawesi, South Sulawesi, West Sulawesi, Gorontalo, West Nusa Tenggara, East Nusa Tenggara, Jambi, Aceh, North Maluku, Maluku, West Kalimantan, East Kalimantan, Central Kalimantan, and South Kalimantan.

The model selection from panel data regression consisted of pooled ordinary least squares (OLS), fixed effect, and random effect models. Tests conducted to select the best model between ordinary least squares, fixed effects and random effects were the Chow test and the Hausman test (Dang, 2019). The Lagrange test is carried out if the results of the Chow test and Hausman test show that pooled ordinary least squares and random-effects model is more suitable to be used; the Lagrange test is used to determine the best model between pooled ordinary least squares and random effects (Shawtari, 2018). Autocorrelation and heteroscedasticity problems in model testing can be detected and resolved through the use of robust standard errors (Hoechle, 2007).

4. Research result and discussion

This section discusses the results of the empirical testing of this research, which is then followed by a discussion of the results of this research.

4.1. Descriptive statistics

Table 3 Panel A shows descriptive statistics of statistical testing before the Covid-19 pandemic; statistical testing before the Covid-19 pandemic was carried out using data for nine months (T = 9) from 33 provinces (n = 33), so the total number of observations is 297 (N = 297). The average growth of working capital loan (ΔWC) is 0.2343 with a range that varies from –21.4823 to 24.2592; average investment loan growth (ΔINV) is 0.5424 with a minimum value of –25,2106 and a maximum value of 31.6046; average consumer loan growth (ΔCONS) is 0.6852 with a value variation of –1.3082 to 3.8482. The independent variable of P2P loan growth (ΔP2P) is 10.7939 with a minimum value of 0.3431 and a maximum value of 45.7662. The average of the control variables is 0.1773 for average deposit growth (ΔDEP) with a variety of values from –12.3228 to 14.6502; the average number of bank offices (ln NB) is 4.2978 with a minimum value of 2.7726 to a maximum value of 6.2344; average gross domestic product growth in the provinces is 0.0386, with values varying from –4.5106 to 4.4722.

Table 3. Descriptive statistics

	Variable	Mean (1)	Std. Dev (2)	Min (3)	Max (4)
	ΔWC	0.2343	3.4608	–21.4823	24.2592
PANEL A: Before Covid-19 Pandemic	ΔINV	0.5424	3.3201	–25.2106	31.6046
	ΔCONS	0.6852	0.6061	–1.3082	3.8482
	ΔP2P	10.7939	3.6569	0.3431	45.7662
	ΔDEP	0.1773	2.7045	–12.3228	14.6502
	NB	4.2978	0.8437	2.7726	6.2344
	ΔGDP	0.0386	1.3624	–4.5106	4.4722
Panel B: During Covid-19 Pandemic	ΔWC	0.8078	2.0045	–8.574	7.31
	ΔINV	0.5524	10.3227	–22.327	163.602
	ΔCONS	0.3597	0.7369	–3.815	3.977
	ΔP2P	6.7654	5.3973	–9.54	51.598
	ΔDEP	0.5132	3.2929	–13.28	18.956
	NB	4.3002	0.8351	2.7726	6.1506
	ΔGDP	0.4172	1.1322	–3.093	3.084

Notes: ΔWC = working capital loan growth, Δ INV = investment loan growth, Δ CONS = consumer loan growth, Δ P2P = P2P loan accumulated value growth, Δ DEP = banking deposit growth, NB = number of bank offices, Δ GDP = gross domestic product growth in each province.

Table 3 Panel B shows descriptive statistics of statistical tests during the Covid-19 pandemic in July 2020-March 2021 or nine months (T = 9) in 33 provinces (n = 33), so the total number of observations is 297 (N = 297). The average growth of working capital loan (ΔWC) is 0.8078 with a range of –8,574 to 7.31; average investment loan growth (ΔINV) is 0.5524 with variations in value from –22.327 to 163.602; average consumer loan (ΔCONS) is 0.3597 with a minimum value of –3,815 and a maximum value of 3.977. The independent variable P2P loan growth (ΔP2P) is 6.7654 with a value range of –9.54 to 51.598. The average savings growth control variable (ΔDEP) is 0.5132 with a variation of values from –13.28 to 18.956; the average number of bank offices (ln NB) is 4.3002, with a minimum of 2.7726 to a maximum value of 6.1506; average gross domestic product growth across different provinces is 0.4172 with a value range between –3.093 to 3.084.

4.2. Model testing

This section discusses about the model testing to determine the suitable panel regression model used in this research to solve the research problem.

4.2.1. Research model testing in the situation before the Covid-19 pandemic

Table 4 Panel A is a test of determining the most suitable model for conditions before the Covid-19 pandemic. Table 4 Panel A column 1 is a test of the most suitable model for testing the effect of P2P loans on banking working capital loans before the onset of Covid-19. The result of the Chow test shows a significant result of 0.0103; therefore, the fixed-effect model is more suitable for use in this test model. The next test used is the Hausman test, which shows an insignificant result of 0.5404, hence, the random-effects model is more suitable to be used compared to the fixed-effect model. The next test used is the Lagrange test, which shows a significant result of 0.0095, thus, the random-effects model is a more suitable choice than the ordinary least squares. The variance inflation factor (VIF) is 3.61 or below 10, so it can be concluded that there is no sign of multicollinearity in the models tested.

Table 4 Panel A column 2 is a test of the most suitable model for testing the effect of P2P lending on banking investment loans before the onset of Covid-19. The result of the Chow test is shown to be insignificant, namely 0.5012; therefore, the random effect model is more suitable to be used in testing this model. The next test used is the Lagrange test to determine the most suitable choice between random effects or the ordinary least square model. The result of the Lagrange test is insignificant, with the result of 1.00, making the ordinary least squares more suitable for use in this model. The variance inflation factor (VIF) is below 10, which is 1.06, so it can be concluded that there is a sign of no multicollinearity in the model used.

Table 4 Panel A column 3 is a test to select the most suitable model to test the effect of P2P lending on banking consumer loans before the onset of Covid-19. The results of the Chow test and Lagrange test show insignificant results, namely 0.1742 and 0.2356, respectively, thus, the ordinary least squares is more suitable for testing this model. The variance inflation factor (VIF) is below 10,

Table 4. Chow Test, Hausman Test, Lagrange Test, and Variance Inflation Factor (VIF)

	Working Capital Loan (1)	Investment Loan (2)	Consumer Loan (3)
PANEL A: Before Covid-19 Pandemic			
Prob>F (Chow Test)	0.0103 **	0.5012	0.1742
Hausman Test	0.5405		
Lagrange Test	0.0095 ***	1.0000	0.2356
VIF (Variance Inflation Factor)	3.61	1,06	1,06
Model Selection	RE	OLS	OLS
PANEL B: During Covid-19 pandemic			
Prob>F (Chow Test)	0.0174 **	0.6461	0.4014
Hausman Test	0.3178		
Lagrange Test	0.0267 **	1.0000	0.4616
VIF (Variance Inflation Factor)	1.78	1,03	1,03
Model Selection	RE	OLS	OLS

Note: *** p < 0.01, ** p < 0.05, * p < 0.1; Notes: RE = Random Effect, OLS = Ordinary least square.

which is 1.06, so it can be concluded that there is no sign of multicollinearity in the model used.

4.2.2. Research model testing in the situation during the Covid-19 pandemic

Table 4 Panel B is the testing of the most suitable model to test the effect of P2P lending on bank loans during the Covid-19 outbreak. Table 4 Panel B column 1 is a test of the effect of P2P loans on bank working capital loans. The result of the Chow test in Table 4 Panel B column 1 shows a significant result of 0.0174, thus, the fixed-effect model is a more suitable choice. The testing is continued by the Hausman test to select the best model between fixed effects and random effects; the Hausman test result shows an insignificant result of 0.3178, so the random effect is a more suitable choice. The selection of random effect needs to be retested with the Lagrange test, which shows a significant result of 0.0267, so selecting random effect is more appropriate than ordinary least squares.

Table 4 Panel B columns 2 and 3 is a test of the suitability of the model for the effect of P2P lending on investment loans and consumer loans during the Covid-19 pandemic. The results of the Chow and Lagrange tests in Table 4 panel B columns 2 and 3 show insignificant results, so the best model to test the effect of P2P lending on investment loan and consumer loan during the Covid-19 pandemic is ordinary least squares. The variance inflation factor (VIF) in panel B columns 2 and 3 is 1.03, so it can be concluded that there is no sign of multicollinearity in the model.

5. Research results

5.1. The effect of P2P loans on bank credits based on the segment of bank credit before the Covid-19 pandemic exogenous shock

The results of testing the effect of P2P loans on banking working capital loans before the Covid-19 pandemic exogenous shock are listed in Table 5 column 1. The results show that the growth of P2P loans (ΔP2P) has a significant negative effect on the growth of working capital loans in Indonesia before the Covid-19 exogenous shock (β = –0.069; p-value = 0.020). The control variable for the growth of third-party funds (ΔDEP) has a significant positive effect on the growth of working capital loans in conditions before the Covid-19 pandemic (β = 0.420, p-value = 0.000). The control variable number of offices (NB) has no significant effect on the growth of working capital loans before the Covid-19 pandemic exogenous shock occurred. The control variable for the growth of gross domestic product (ΔGDP) has a significant positive effect at the significance level of 10% on the growth of working capital loans in conditions before the Covid-19 pandemic exogenous shock (β = 0.199, p-value = 0.051). The R-square result of this model testing is 11.25%.

Table 5 column 2 is the result of testing the effect of P2P lending on banking investment loans before the

Table 5. Summary of model estimation results before the occurrence of Covid-19 exogenous shock

Variables	ΔWC (1)	ΔINV (2)	ΔCONS (3)
ΔP2P	–0.069**	–0.053	–0.003
	(0.020)	(0.165)	(0.741)
ΔDEP	0.420***	–0.053	0.036***
	(0.000)	(0.541)	(0.002)
NB	–0.280	–0.083	–0.219***
	(0.225)	(0.603)	(0.000)
ΔGDP	0.199*	0.112	0.107***
	(0.051)	(0.393)	(0.000)
Constant	2.099	1.480	1.645***
	(0.125)	(0.149)	(0.000)
R-squared	0.1125	0.006	0.172

Notes: Robust p-value in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1; ΔWC = working capital loan growth, ΔINV = investment loan growth, ΔCONS = consumer loan growth, ΔP2P = P2P loan accumulated value growth, ΔDEP = banking deposit growth, NB = number of bank offices, ΔGDP = gross domestic product growth in each province.

Covid-19 pandemic exogenous shock. The test results show that the growth of P2P loans (Δ P2P) and the control variables for the growth of third-party funds (Δ DEP), number of offices (NB), and growth of gross domestic product (Δ GDP) have no significant effect on investment loan growth in conditions before the Covid-19 pandemic exogenous shock. The R-square result of this model testing is 0.60%.

The results of testing the effect of P2P loans on consumer loans in the situation before the Covid-19 pandemic exogenous shock are listed in Table 5 column 3. The results show that the growth of P2P loans (Δ P2P) has no significant effect on the growth of consumer loans before the Covid-19 pandemic occurred (β= –0.003; p-value= 0.741). The control variable growth of third-party fund (Δ DEP) has a significant positive effect on the growth of consumer loans in conditions before the Covid-19 pandemic exogenous shock (β = 0.036, p-value = 0.002). The control variable number of offices (NB) has a significant negative effect on the growth of consumer loans when the Covid-19 pandemic exogenous shock has not yet occurred. The control variable for the growth of gross domestic product (ΔGDP) has a significant positive effect on the growth of consumer loans in conditions before the Covid-19 pandemic (β = 0.107, p-value = 0.000). The R-square result of this model testing is 17.20%.

Empirical test results on the situation before the Covid-19 pandemic exogenous shock showed results that are in line with the initial hypothesis, that P2P lending has a negative effect on the main banking loan market, namely the working capital market, in other words, P2P loans have become disruptive to bank loans in recent years, moments before the Covid-19 pandemic exogenous shock.

5.2. The effect of P2P loans on bank credits based on the segment of bank credit during the Covid-19 pandemic exogenous shock

The results of testing the influence of P2P loans on banking working capital loans during the Covid-19 pandemic exogenous shock are listed in Table 6 column 1. The results show that the growth of P2P loans (ΔP2P) has a significant positive effect on the growth of working capital loans during the Covid-19 pandemic exogenous shock (β = 0.108; p-value = 0.013). The control variable for the growth of third-party funds (ΔDEP) has a significant positive effect on the growth of working capital loans in conditions of the Covid-19 pandemic exogenous shock (β = 0.111, p-value = 0.005). The control variable number of offices (NB) has a significant negative effect on the growth of working capital loans during the Covid-19 pandemic exogenous shock (β = –0.356, p-value = 0.017). The control variable for gross domestic product growth (ΔGDP) has no significant effect on the growth of working capital loans in conditions during the Covid-19 pandemic (β = 0.063, p-value = 0.519). The R-square result of this model testing is 9.57%.

The results of testing the effect of P2P loans on investment loans during the Covid-19 pandemic exogenous shock are listed in Table 6 column 2. The test results show that the growth of P2P loans (ΔP2P) as well as the control variables for the growth of third-party funds (ΔDEP), the total number of offices (NB), and growth of gross domestic product (ΔGDP) have no significant effect on investment loan growth during the Covid-19 pandemic. The R-square result of this model testing is 0.40%.

The results of testing the effect of P2P loans on consumer loans during the Covid-19 pandemic exogenous shock are listed in Table 6 column 3. The results show that the growth of P2P loans (ΔP2P) has a significant positive effect on the growth of consumption loans during the Covid-19 pandemic exogenous shock (β = 0.029; p-value = 0.006). The control variable for the growth of third-party funds (ΔDEP) has a significant positive effect on the growth of consumption loans in conditions of the Covid-19 pandemic exogenous shock (β = 0.038, p-value = 0.001). The control variable number of offices (NB) has a significant negative effect on the growth of consumer loans during the Covid-19 pandemic (β = –0.143, p-value = 0.005). The control variable for the growth of gross domestic product (ΔGDP) has no significant effect on the growth of consumer loans in conditions during the Covid-19 pandemic (β = 0.016, p-value = 0.562). The R-square result of this model testing is 9.7%.

Table 6. Summary of model estimation results during the occurrence of Covid-19 exogenous shock

Variables	ΔWC (1)	ΔINV (2)	ΔCONS (3)
ΔP2P	0.108**	0.062	0.029***
	(0.013)	(0.504)	(0.006)
ΔDEP	0.111***	0.077	0.038***
	(0.005)	(0.374)	(0.001)
NB	–0.356**	–0.496	–0.143***
	(0.017)	(0.214)	(0.005)
ΔGDP	0.063	–0.225	0.016
	(0.519)	(0.464)	(0.562)
Constant	1.526**	2.317	0.753***
	(0.037)	(0.227)	(0.002)
R-squared	0.0957	0.004	0.097

Notes: Robust p-value in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1; ΔWC = working capital loan growth, ΔINV = investment loan growth, ΔCONS = consumer loan growth, ΔP2P = P2P loan accumulated value growth, ΔDEP = banking deposit growth, NB = number of bank offices, ΔGDP = gross domestic product growth in each province.

The results of empirical testing at the time of the Covid-19 pandemic exogenous shock show opposite results from the initial hypothesis. Empirical test results show that the growth of P2P loans has a positive or complementary effect on the growth of working capital loans and consumer loans, and the growth of P2P loans has no effect on the growth of investment loans.

5.3. Discussion

Prior to the exogenous shock of the Covid-19 pandemic, P2P loans did not affect banking investment loans and consumer loans, but P2P loans had a negative effect on banking working capital loans. Based on the theory of disruptive innovation, the results of this empirical test show that P2P lending is not at the new entrant trajectory stage that serves the low-end market or niche market. This is evident from the fact that P2P lending does not interfere with smaller banking markets, namely the investment loan and consumer loan markets. On the other hand, P2P lending has proven to have disrupted or become a substitute for the main banking market, namely the working capital market, which has the largest portion of total bank credit. The reason that allows for a disruptive effect on banking credit or banking working capital credit is that, for five years (2016–2021), P2P platforms have been operating and been known and accepted by the public. This is evident from Figure 2, which shows that the accumulated number of accounts or borrower accounts has grown rapidly from 4,359,448 accounts in 2018 to 43,561,362 accounts in 2020, or a rapid increase of 899.24% from 2018 to 2020. The benefits provided by P2P products are seen by the main market or the banking working capital loan market, so banking customers in the main market or working capital loan market switch to using technology from the P2P platform. In addition, the convenience or flexibility provided by the P2P platform, especially regarding the collateral required for P2P loans; as it does not have to be in the form of asset guarantees but can be in the form of guarantees such as invoices, personal guarantees, and so forth.

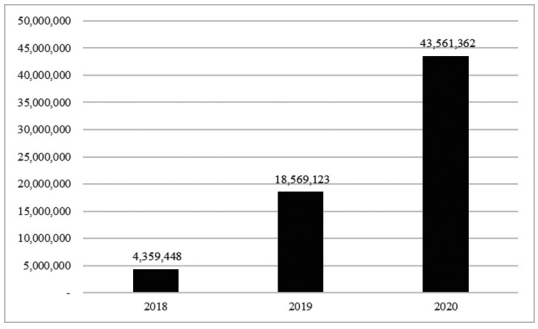

Figure 2. The accumulated number of borrower accounts 2018–2020

During the exogenous shock of the Covid-19 pandemic, P2P loans had a positive effect on the growth of working capital loans. Based on consumer theory, P2P loans are complementary to banking working capital loans during the Covid-19 pandemic exogenous shock. A possible reason for the results of this test is that banks have begun to react to market disruptions from P2P start-up companies, so banks now have credit cooperation, channelling credit through P2P platforms. In addition, the researcher is of the view that the exogenous shock of the Covid-19 pandemic caused physical distancing or restrictions on community activities, thus encouraging the urgency for banks to cooperate with P2P platforms and utilise FinTech owned by P2P platforms as means of intermediation or online credit channelling. Another argument is that the Covid-19 pandemic that occurred in Indonesia caused the Central Bank of the Republic of Indonesia to issue Bank Indonesia Regulation (PBI) No. 22/4/PBI/2020, which provided incentives for easing the statutory reserve requirement for banks that distribute micro business loans, import and export, to non-MSME loans in priority sectors or productive sectors in the national economic recovery program. With incentives from Bank Indonesia, banks can still grow in line with the growth of P2P loans, or P2P platforms flexibility complementing the bank credit relaxation during the Covid-19 pandemic.

P2P loans are also complementary to banking consumer loans during the exogenous shock of the Covid-19 pandemic in Indonesia. A possible argument for the results of this research is that the P2P platform performs an online credit channelling function for banks during the Covid-19 pandemic, besides that, the P2P platform allows collaboration with banks to finance down payment instalments for property purchases because banks do not provide such facilities.

In the investment loan market segment, P2P loans do not affect banking investment loans before the Covid-19 outbreak or during the Covid-19 outbreak. A possible reason is that loans distributed by P2P platforms are more focused on short-term loans, namely working capital loans and consumer loans, whereas investment loans are long-term loans. Therefore, it can be concluded that the P2P platform market segment is not the investment loan market segment, so the presence of P2P loans is neither a competitor nor a complement to banking investment loans.

The shift from disruptive effects to complementary effects is a good thing for P2P platforms and banking, but the researcher is of the view that banks should remain cautious about the presence of P2P platforms because the complementary effect that occurs can also be temporary due to banks receiving incentives from Central Bank of the Republic of Indonesia, which gives banks more power to go against P2P platforms.

6. Conclusions

The purpose of this study is to examine the effect of P2P lending on bank loans based on the type of loan (working capital loan, investment loan and consumer loan) before as well as during the exogenous shock of the Covid-19 pandemic. The test results show that P2P loans had a significant negative effect or are disruptive (substitute) on working capital loans prior to the exogenous shock of the Covid-19 pandemic. At the time of the Covid-19 pandemic exogenous shock, P2P loans had a significant positive or complementary effect on working capital loans and consumer banking loans. In addition, P2P loans have no significant effect on a banking investment loan, both before and during the exogenous shock of the Covid-19 pandemic.

Theoretically, the theory of disruptive innovation states that the P2P platform can truly be said as a disrupter if P2P lending interferes or becomes a substitute for the main segment of the banking market. However, previous studies that discussed the effect of P2P lending on bank loans have not discussed the effect of P2P loans on bank loans based on the type of loans segment, so this research is able to fill the gaps of these studies. In addition, this study also fills the gap of previous studies by examining in more detail the influence of P2P lending on bank loans based on the type of loan segment before and during the exogenous shock. To the best of the researcher's knowledge, there has been no research that has examined the effect of P2P lending on bank loans based on the type of bank loan before and after the exogenous shock.

In practice, this research is useful for banks to understand that P2P lending has the potential to be disruptive in the main banking market in normal situations (no exogenous shock of Covid-19). Therefore, banks should remain vigilant to respond to the potential for disruption that could continue after the exogenous shock of the ovid-19 pandemic subsides. Even though P2P loans are a complement to bank credit in a situation where the exogenous shock of the Covid-19 pandemic occurs, it is not certain that the complementary effect is permanent since banks can survive during the Covid-19 exogenous shock because the Central Bank of Indonesia provided incentives, loosening Statutory Reserves, which made it easier for banks in lending to the productive sector. Banks as incumbents should continue to develop collaborations with P2P platforms and develop divisions focused on developing FinTech, as an effort to guard against the disruptive potential of P2P lending on bank loans after the Covid-19 pandemic ends and the incentive stimulus from the Central Bank of the Republic of Indonesia is no longer extended. The exogenous shock of the Covid-19 pandemic should be viewed as an opportunity by banks to reorganise their banking digitalisation strategy.

The disruptive (substitution) and complementary effects of P2P lending on bank lending demonstrate the importance of FinTech in the development of the financial sector landscape. Therefore, the urgency of using FinTech should encourage the government and regulators to develop policies that support the development of P2P platforms to facilitate online lending and support financial inclusion in Indonesia. The government should relax policies to accelerate the development of banking digitalisation, but still pay attention to prudent banking principles, and the government can facilitate the collaboration of P2P start-up companies with banks, such that P2P platforms and banking are expected to grow together.

Limited access to data in this study confined the researcher from including other variables to obtain a more suitable research model. For future research, this study suggests examining the effect of P2P lending on banking loans by segment or type of loans after the temporary exogenous shock of the Covid-19 pandemic, because the results of the study may be different after the pandemic ends, enabling banks to adapt after the temporary exogenous shock or, on the contrary, a disruptive or substitution effect may occur after the incentive stimulus from the Central Bank of the Republic of Indonesia is stopped.

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