



Volume 74
Forthcoming articles
<https://doi.org/10.18267/j.polek.1506>
Open Access



Fintech Borrowing and Business Changes During the Pandemic

Kunhyui Kim, Peter J. Morgan, Martina Marsili

Kunhyui Kim (*corresponding author*, email kkim@soec.nagoya-u.ac.jp), Graduate School of Economics, Nagoya University, Nagoya, Japan

Peter J. Morgan (email: pmorgan@adbi.org), Asian Development Bank Institute, Tokyo, Japan

Martina Marsili (email: marsili0martina@gmail.com), Accenture, Japan

Abstract

Micro, small and medium-sized enterprises in ASEAN play a significant role in ASEAN GDP, but their access to financial services or Fintech has been relatively low. In this context, the emergence of companies offering Fintech services, or technology-enabled financial services, has been welcomed to access financial services that would otherwise be difficult to obtain from formal financial institutions during the pandemic. Our research focusses on five Association of Southeast Asian Nations countries, particularly Indonesia, Malaysia, the Philippines, Singapore, and Thailand, to answer the following questions. First, what is the impact of the usage of Fintech platforms on business performance, particularly in terms of revenue and profit, during the pandemic? Then, we evaluate the channels of firm activities driven by Fintech borrowing during the COVID-19 period. The empirical findings show that Fintech borrowing generally improved MSMEs' business performance during the pandemic, both revenues and profits.

Keywords: Business performance, fintech borrowing, Heckman ordered probit, pandemic, probit, micro, small and medium-sized enterprises

JEL Classification: D14, G20, G23

1. Introduction

Economic shocks often drive technological advances, which may cause long-term economic changes. The World Health Organization (WHO) publicly and officially declared Coronavirus disease 2019 (COVID-19) as a pandemic in March 2020. The pandemic officially lasted until early to mid-2023 and changed the lives and systems of individuals and businesses. Increased concerns about public health drove firms' motivation to rely on non-face-to-face and convenient business models of communication and exchange of services. Fu and Mishra (2022) showed that firms' digital offerings increased during the pandemic in terms of digital offerings, such as the rate of finance app downloads. Adopting digital finance, including financial technology (Fintech), may help households and firms alleviate adverse socioeconomic effects such as health risks.

Our research focusses on five Association of Southeast Asian Nations (ASEAN) countries – Indonesia, Malaysia, the Philippines, Singapore, and Thailand – to answer the following questions. First, what is the impact of the usage of Fintech platforms on business performance, particularly in terms of revenue and profit, during the pandemic? While past research on the adoption of digital offerings during the pandemic relates to the growing literature on the components and mechanisms behind Fintech adoption (Crouzet *et al.*, 2019; Higgins, 2019), our research focuses on the impact of borrowing from Fintech platforms on the business performance of micro, small and medium-sized enterprises (MSMEs) of five aforementioned economies during economic shock, using novel survey data. Then, we evaluate the channels of firm activities driven by Fintech borrowing during the COVID-19 period. We aim to find specific channels between Fintech borrowing and business performance to discover the impact of Fintech borrowing during the pandemic thoroughly. Particularly, we distinguish the economic and organizational factors closely related to firms' business performance and empirically evaluate the relationship between Fintech borrowing and each channel, examining the mechanism between Fintech borrowing and business performance during the pandemic.

Micro, small, and medium-sized enterprises (MSMEs) play a significant socioeconomic role in ASEAN member countries. Between 2010 and 2019, MSMEs in the ASEAN region, namely, Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam, represented 97% of all business enterprises, provided jobs to 69% of the workforce, and contributed 41% to their gross domestic product (GDP), on average (Asian Development Bank, 2020; The ASEAN Secretariat, 2024). However, MSMEs in ASEAN remain significantly excluded from formal financial services. Specifically, during the COVID-19 period, ASEAN MSMEs struggled with financial constraints, particularly with respect to investments in capacity and education for employees compared to larger companies. However, at the same time, the small size of MSMEs sup-

ported agility and adaptability to various economic shocks, and these advantages increased the speed of seizing the opportunities to overcome such shocks (Marsan and Sabrina, 2020).

Adopting financial technology is one of the significant strategies firms can use to quickly react to economic shocks and improve their performance during the pandemic. Nevertheless, when looking for financing options, MSMEs often face constraints, including a lack of appropriate collateral and difficulties in assessing the businesses' creditworthiness. Only approximately 60% of MSMEs in ASEAN countries used bank loans as means of financing before the pandemic. The ratio even dropped during the pandemic. Even though loan size has been increasing, the usage of formal financial services remains low relative to MSMEs' contribution to countries' GDP (Deloitte, 2015). According to the World Economic Forum survey (2022), access to financial services is important for MSMEs because it helps them manage cash flows and expenses, grow the business, and act as a safety net, which is critical to overcoming economic situations during the pandemic (World Economic Forum, 2022, p. 9).

Our research focuses on the impact of Fintech services that the MSMEs adopted during the pandemic. In this context, the emergence of companies offering Fintech services, or technology-enabled financial services, has been welcomed to enable firms to access financial services that would otherwise be difficult to obtain from formal financial institutions during the pandemic. Fintech can be understood as the application of technologies, including digital devices, platforms, and software, to create new financial products and services (Beck, 2019; Morgan, 2022). In recent years, in part due to efforts to overcome the economic situation from the pandemic, the Fintech sector in the ASEAN region has been experiencing significant growth, despite at times inconsistently across different countries (Morgan, 2022). For Indonesia, Malaysia, the Philippines, Singapore, and Thailand, the volume of transactions through alternative online platforms reached around \$18.5 billion between 2019 and 2020 (CCAF, 2022, p. 99). The Fintech market in Southeast Asia, led by Indonesia, mostly showed resilience to the COVID-19 pandemic, reaching a volume of \$2.3 billion (CCAF, 2022, p. 101; World Economic Forum, 2022).

The current academic discourse surrounding Fintech has mainly focused on Fintech companies, such as peer-to-peer (P2P) platform operators, their role within the financial sector, and their potential to increase financial inclusion (Cornaggia *et al.*, 2018; Huang, 2022; Jangtiani and Lemieux, 2018; Lu, 2018; Segal, 2015). However, little is known about the relationship between firms' borrowing through Fintech platforms and their business performance, particularly as a tool to overcome the negative effects of the pandemic. Considering the socio-economic importance of MSMEs in ASEAN countries and the growth the Fintech market has been experiencing, we conduct an empirical analysis using survey data to fill this knowledge gap. The empirical findings show that Fintech borrowing general-

ly improved MSMEs' business performance during the pandemic, both revenues and profits, through expanding customers, launching new products or services, paying off existing loans, and reducing financial losses.

The rest of the paper is as follows. First, we describe the past related literature and the theoretical background of our research. Data description and empirical methodology sections examine the impact of Fintech borrowing on business performances during the pandemic. We conclude our research with empirical results and conclusions, including policy recommendations.

2. Literature Review

Much of the literature on MSMEs' digital borrowing has focused on funding success and loan interest rate determinants (Bachmann *et al.*, 2011; Gosh *et al.*, 2021; Lin *et al.*, 2013; Pierrakis, 2019). Challenged by information asymmetries, P2P platforms base their funding decision on existing financial information, but, especially when this is insufficient, they also rely on demographic information, such as gender, age, and race, as well as social information, such as friendship networks or group membership (Bachmann *et al.*, 2011; Lin *et al.*, 2013). For example, on platforms where an applicant can list friends' names, applicants with online friends are associated with higher loan acceptance and lower interest rates (Lin *et al.*, 2013). Reliance on digital technologies can also contribute to funding success by providing the P2P platform with alternative sources of information. For instance, Gosh *et al.* (2021) discovered a positive relationship between use of cashless payments and digital loan approval. In particular, they found that greater use of cashless payment was associated with lower interest rates and higher loan amounts. Alternative Credit Scoring (ACS) represents another example in which synergy between digital technologies, namely AI and big data, can exploit digital users' rich data to assess a borrower's creditworthiness (Widiyasari and Widjaja, 2021).

Another portion of the literature has focused on determinants of borrowing sources, showing mixed results for both SMEs (Barkley and Schweitzer, 2020; Eça *et al.*, 2022) and individuals (De Roure *et al.*, 2018; Emekter *et al.*, 2015; Fuster *et al.*, 2019). According to Barkley and Schweitzer (2020), Fintech borrowers are likelier to be businesses to which banks deny credit. On the other hand, Eça *et al.* (2022) found that creditworthy SMEs use digital lending as an additional source of financing to diversify their pool of lenders. Coakley and Huang (2020) also found that SMEs with high credit ratings, albeit struggling with low collateralizable assets, are likelier to choose P2P lending platforms over banks for medium-term loans. Similarly, for the consumer lending market, some found Fintech borrowers to be riskier and less profitable than individuals borrowing from banks (De Roure *et al.*,

2018; Emekter *et al.*, 2015), while others rejected this hypothesis (Fuster *et al.*, 2019).

The relationship between digital lending platforms and traditional financial institutions is poorly understood. Several authors have asked whether digital lending platforms are substitutes or complements of traditional financial institutions. General evidence supports the “complements” hypothesis with some reservations for rural areas or areas with fewer banks per population (Jangtiani and Lemieux, 2018; Cornaggia *et al.*, 2018). Regarding the impact of digital lending on subsequent lending, Balyuk (2019) and Beaumont *et al.* (2019) found that SMEs that took digital loans received increased bank credit.

One significant question is the impact digital lending has on MSMEs’ business performance. Considering MSMEs’ social economic role in the ASEAN region, knowing whether borrowing from P2P platforms or similar digital lending channels can impact business performance could be consequential. Existing studies have shown that digital lending reduces financing constraints for small businesses that would otherwise not have sufficient access to capital to finance their growth (Huang, 2022; Lu, 2018; Segal, 2015). While encouraging, these studies lack an empirical analysis of the relationship between digital lending, financial inclusion, and growth. It is also possible for digital lending to affect business performance through other channels. For example, online digital lending platforms could offer online creditworthiness scores relying on data collected from previous loans. In many cases, Fintech platform operators also assist companies seeking funding.

However, the above question demands that another question be answered first. That is, is digital lending associated with business performance change at all? Balyuk *et al.* (2022) found that Fintech lending positively and significantly correlated with new hires, but only for businesses with employee sizes smaller than 50. Using the Small Business Credit Survey (SBCS) data on American firms, Barkley and Schweitzer (2020) empirically show that businesses that receive more Fintech loans are anticipated to perform better in employment and revenue growth than those receiving bank loans. While these results are promising, much of the above-mentioned literature has focused on advanced economies in Europe and North America (Balyuk *et al.*, 2022; Beaumont *et al.*, 2019; Coakley and Huang, 2020; Eca *et al.*, 2022; Pierrakis, 2019). Additionally, although there are some implementation challenges, the prospects of Fintech growth in the Middle East and North African (MENA) region are expected to contribute to employment opportunities and financial outreach (Naz *et al.*, 2022). However, the research lacks empirical evidence on the impact of Fintech for developing economies. Our research contributes to this area by focusing on the Fintech borrowing by ASEAN MSMEs during the pandemic. We conduct empirical analysis on the relationship between the amount borrowed from Fintech platforms and business performance changes of ASEAN MSMEs during the pandemic.

3. Theoretical Background

3.1 Fintech borrowing by MSMEs in ASEAN during the pandemic

Expansion of digital technologies during the pandemic is not surprising. Past research has highlighted the relationship between the COVID-19 pandemic and the adoption of digital technologies (Matt *et al.*, 2021; Papadopoulos *et al.*, 2020). There exists a number of strategies and options that firms choose to overcome the challenges that occurred during the pandemic, such as inventing a new business model, investing in different levels of technologies, or adopting newer technologies for cost effectiveness.

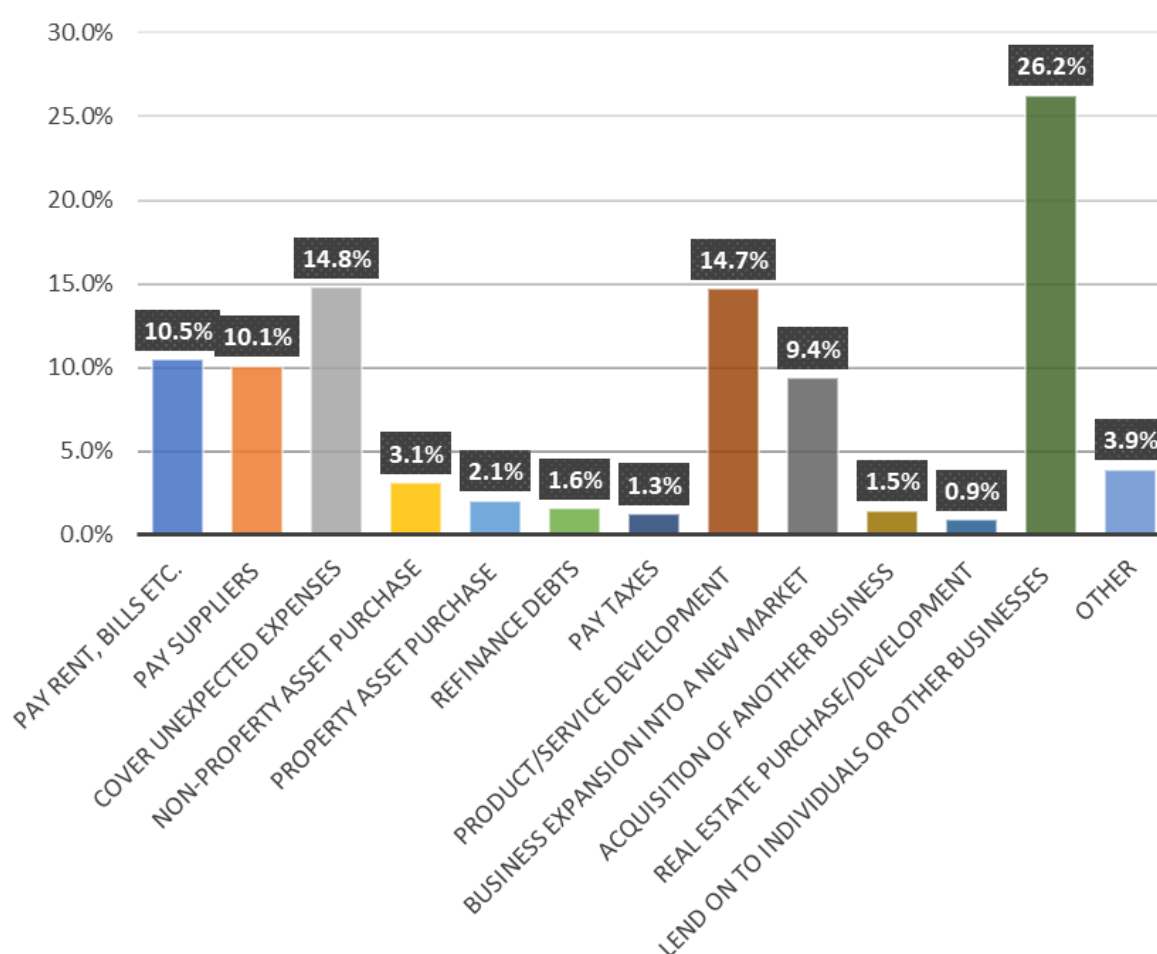
During the pandemic, firms using Fintech were able to seize more business opportunities as digital banks arrived in the region (Singapore Fintech Association, 2019). While COVID-19 had a negative impact on investment by ASEAN firms in the early stages, the pandemic eventually boosted the digital economy which increased the business opportunities for firms engaging with Fintech (United Overseas Bank, 2020). ASEAN firms took advantage of the digital economy, such as digital payments, as a tool to expand their businesses during the pandemic. From 2020 to 2021, Fintech funding more than tripled in ASEAN region (Singapore Fintech Association, 2021). Digital payments businesses expanded rapidly, and ASEAN consumers adapted to the usage of digital financial services quickly.

While MSMEs of various sizes rely on P2P loans, they tend to be used more by smaller firms in terms of both revenues and number of full-time employees (FTEs). Moreover, they tend to be companies that have either just started their operations or have not been operating for more than 5 years. This is not surprising considering the fragile nature of small enterprises which are more exposed to external shocks, and it suggests that younger companies that lack a credit history may be more willing to turn to P2P platform operators for loans rather than to traditional players such as banks, particularly in the times of economic shock such as COVID-19.

One business model with disruptive potential for the region's MSMEs is that of P2P lending, which enables retail as well as commercial lenders to invest in companies through an online platform. Prior to the pandemic, P2P/Marketplace Lending alongside Balance Sheet Business Lending generated around 60% of the total alternative finance transactions (CCAF, 2021, p. 100). Furthermore, in Indonesia alone, the number of P2P borrowers grew from 38,105 to 15,98 million borrowers between 2016 and 2019, and the number of lenders also grew from 14,364 to 578,158 (OJK, 2019).

Many firms borrow P2P loans to finance their business' growth or improve its resilience. From our survey data on MSMEs in ASEAN countries during pandemic, funds borrowed online are used to develop new products or services (15%), to pay rent and other utility bills (10%), to pay suppliers (10%), and also to expand the business into a new markets (9%). As MSMEs faced growing financing needs during the COVID-19 pandemic due to restrictions on the movement of people and supply chain disruptions, many companies also relied on P2P borrowing to cover unexpected expenses (15%). In this context, usage of Fintech by MSMEs is a strategic approach to adapt to a difficult environment.

Figure 1: Primary purpose of borrowing from fintech platform



Source: Authors' own calculations

3.2 Fintech and business strategies

Performance of firms is related to environmental, organizational, and people factors (Hansen and Wernerfelt, 1989). Environmental factors include sociological, political, economic, and technological factors that influence the market outcomes of firms. They may directly affect

the profitability of firms. Organizational factors include structure, systems, size, decision making, and the history of the firms. Lastly, people factors include personalities, age, gender, and skills of firm personnel. While they distinguished the determinants of firm performance with environmental, organizational, and people factors, environmental factors are external decisions that are close to economic model of firm performance, whereas organizational factors are related to internal decisions to change the format of firms for further economic benefit, and people factors are related to the characteristics of firms or individuals that affect the business performance. We incorporate both external (environmental or economic) and internal (organizational and people) factors of firms to further conduct empirical analysis. While environmental factors externally and directly affect business performance through revenue or costs, organizational and people factors are related to the transformation of firms internally for further development of business performance.

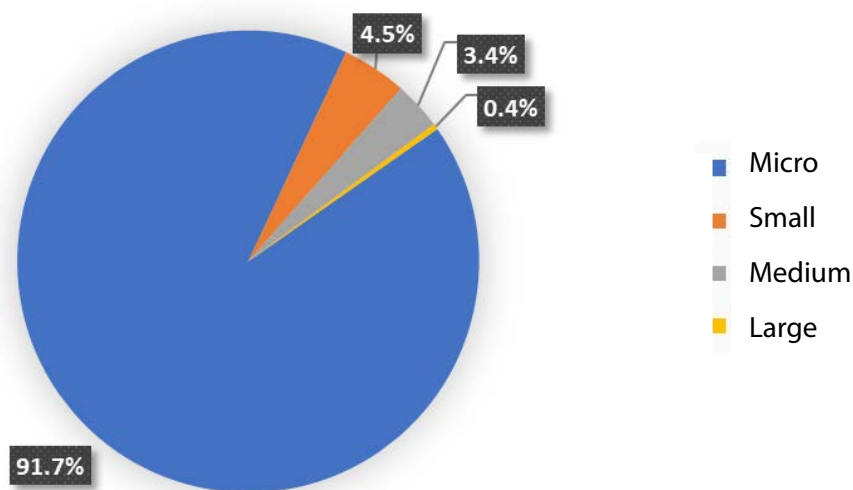
In our analysis, we distinguish the external and internal channels of business platforms. External effects include those decisions that directly affect the revenue or profit of the firms. For our sample, external channels include i) increasing productivity, ii) launching a new product or service, iii) reducing costs, iv) paying off existing loans, v) a financial loss, vi) missing loan repayment to another provider, and vii) being refused a loan from a bank or credit from a supplier particularly for ASEAN MSMEs during the pandemic. These subsets of variables are directly related to the business performance of each firm. Then, we define internal sources that change the shape of business from the inside. In other words, they are more related to the decisions from the decision-making groups, such as the boards for economic profit in the future. We include i) changing the system to expand customer base, and ii) changing the system to attract media coverage. We further employ empirical analysis in the next section using the theoretical background from this section.

4. Data and Methodology

We employ the data from online survey of MSMEs jointly conducted by the Cambridge Centre for Alternative Finance (CCAF) at the University of Cambridge Judge Business School and the Asian Development Bank Institute (ADBI) (CCAF and ADBI, 2022). The use of digital financial services (DFS) increased exponentially across the ASEAN region during the COVID-19 pandemic (CCAF and ADBI, 2022). The purpose of the survey was to assess how much the usage of Fintech grew during the pandemic, and to evaluate how small businesses used Fintech firms to access credit services.

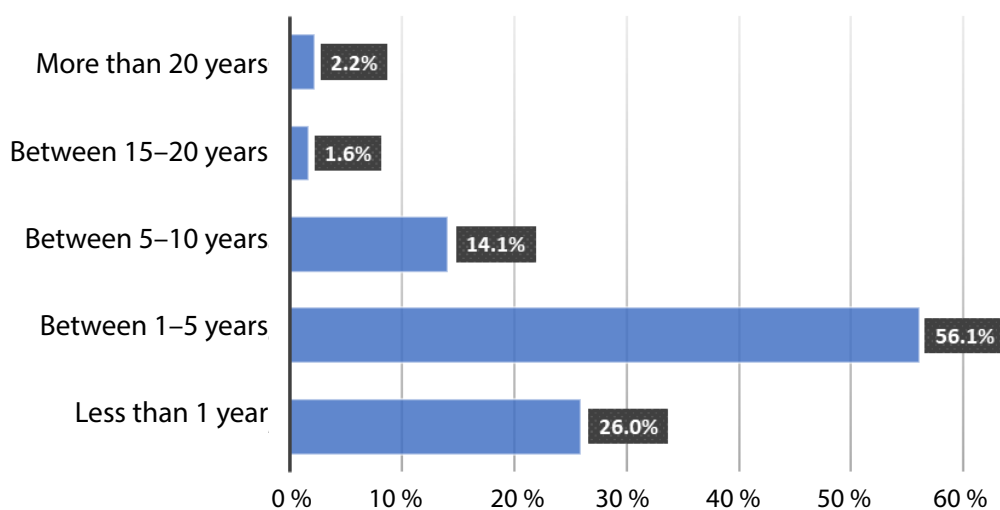
The participants were micro, small, and medium-sized enterprises (MSMEs) from five ASEAN countries: Indonesia, Malaysia, Singapore, Thailand, and the Philippines. The survey was conducted on businesses that utilized Fintech lending or crowdfunding platforms to raise funds in 2021. 91% of the firms in the sample were micro firms. The survey was optimized for desktop and mobile phone-based implementation and includes a total of 612 firms. Participants responded to the online survey via the Fintech platforms that they used shown in Figures 2 and 3.

Figure 2: Company size by revenue



Source: Authors' own calculations

Figure 3: Companies by duration



Source: Authors' own calculations

The survey took place in early 2022 and asked questions regarding general information about the business, and the situation of adopting or borrowing from Fintech services, and their recent business performance during the pandemic, *i.e.*, from 2020 to 2021. As MSMEs account for 97–99% of total establishments of our sample countries, and they contribute approximately 85%, 45%, and 18% to employment, gross domestic product (GDP), and exports, respectively (Marsan and Sabrina, 2020; The ASEAN Secretariat, 2024), our samples economically represent the business environment of our sample countries. Since there may have been an adaptation period for the use of Fintech in the early stages of the pandemic, evaluating the business performance in 2021 may result in a more complete picture of the impact of Fintech on MSME's business performances during the pandemic.

The survey defines the Fintech platform as an internet-based financial service provider. The contents of the survey include the following: i) Demographic information of interviewees such as gender, age, education level, and employment sector; ii) Duration of the business, iii) Firm activities of borrowing from financial platforms such as how often borrowed from the platform, and other sources of finances then using Fintech or marketplace lending, iv) Situation due to the pandemic such as Fintech borrowing during the pandemic, or whether receiving government financial aid, v) Firm decisions to raise funds (external, Fintech, or traditional), vi) Business changes such as employment change, revenue change, profits change, and loan repayment, vii) Amount borrowed from Fintech platform, and viii) Positive and negative outcomes of using Fintech platform which could affect business changes.

Among the information gathered, we use the revenue and profit changes as the measures of business performance of firms. Then, we use the amount borrowed from Fintech platform to represent the firms' degree on Fintech adoption during the pandemic. The degree of borrowing from Fintech platform represents the familiarity of using financial technology for the firms. Then we distinguish external and internal factors of business performance as described in the previous section. We distinguish each factor by thoroughly examine the impact of Fintech borrowing on business performance during the pandemic for ASEAN MSMEs.

Other explanatory variables include subsequent borrowing, and the other sources of borrowing. Both variables are related to the vulnerability to economic shocks. First, subsequent borrowing is important as it is related to the familiarity of the sources. The past literature showed that firms that borrow from Fintech sources are likely subsequently to borrow from different sources such as banks or other fintech platforms (Beaumont *et al.*, 2022; Dai *et al.*, 2025). In other words, subsequent borrowing from specific sources may represent how much the firms have adapted toward to a specific source of borrowing, particularly during the pandemic, and how much that familiarity changed the business performance of the firms during the pandemic. We distinguish the subsequent borrowing as follows: subsequent borrowing from fintech platform, bank, or either one.

Table 1: Summary statistics

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	Mean	SD	Min	Max
Revenue Decreased	616	0.159	0.366	0	1
Revenue Unchanged	616	0.323	0.468	0	1
Revenue Increased	616	0.518	0.500	0	1
Profit Decreased	616	0.169	0.375	0	1
Profit Unchanged	616	0.271	0.445	0	1
Profit Increased	616	0.560	0.497	0	1
Amount Borrowed	616	11,679	99,731	0	2.382e+06
Subsequent	616	0.672	0.470	0	1
Subsequent (Fintech)	616	0.344	0.475	0	1
Subsequent (Bank)	616	0.201	0.401	0	1
Primary Source (Bank)	616	0.141	0.349	0	1
Government Aid	616	0.279	0.449	0	1
Customer	616	0.469	0.499	0	1
Productivity	616	0.646	0.479	0	1
Launched New	616	0.451	0.498	0	1
Cost	616	0.203	0.403	0	1
Paid Loan	616	0.403	0.491	0	1
Attract	616	0.198	0.399	0	1
Financial Loss	616	0.367	0.482	0	1
Refuse	616	0.266	0.442	0	1
Miss	616	0.252	0.434	0	1
Female	616	0.596	0.491	0	1
25–34	616	0.461	0.499	0	1
35–44	616	0.302	0.459	0	1
Over 44	616	0.136	0.343	0	1
Vocational	616	0.130	0.336	0	1
Undergraduate	616	0.490	0.500	0	1
Postgraduate	616	0.205	0.404	0	1
1–5 Year Business	616	0.536	0.499	0	1
5–10 Year Business	616	0.260	0.439	0	1

Source: Authors' own calculations

Note: "N," "SD," "Min," and "Max" refer to observation, standard deviation, minimum value, and maximum value, respectively

Furthermore, we include other sources of borrowing to compare with the impact of fintech borrowing. These include a primary source of borrowing from a bank and government financial aid. Bank borrowing and government sources are typical alternative sources of raising new funds for firms (FAO, n.d.). Small firms' borrowing from banks might be more vulnerable to economic shocks compared to those borrowing from fintech platforms, as COVID-19 struck banks critically. While Fintech platforms focus more on innovative solutions with AI-driven risk management, banks rely more on trust and stability, which would give different results, especially during the pandemic. Therefore, we distinguish borrowing sources to thoroughly examine the impact of Fintech. Additionally, we include variables such as sex, age, education of firm representative, and the length of business to control for firm characteristics Table 1 shows summary statistics of the variables. The correlation table is presented upon request.

Our empirical model assumes that Fintech borrowing and business performance is correlated. Increased Fintech borrowing may affect the business performance of firms. At the same time, improved business performance may affect Fintech borrowing as another option for adopting finance for the next year's business. In other words, an endogeneity issue may arise between our key variables: Fintech borrowing and business performance. To mitigate the endogeneity issue, we conduct a two-stage least squares (2SLS) estimation. We use the previous year's average revenue as an instrumental variable for the amount borrowed from a Fintech platform. The size of the previous year's revenue may determine the amount borrowed from the Fintech platform. We assume that increased access to Fintech platforms by a firm may affect the direction of its business during the pandemic. The previous year's performance of a firm may determine the amount of borrowing from Fintech platform in the current year. If a firm had business losses with increased Fintech borrowing from the previous year, Fintech borrowing for the current year would decrease, and vice versa. In other words, the profitability of the previous year's Fintech adoption would affect the decision of the current year's Fintech adoption. As Carbó-Valverde *et al.* (2022) note, the tendency of Fintech adoption gradually increased during the pandemic. As we employ 2021 survey data from the sample countries, the previous year's revenue may be closely related to the current year's Fintech adoption. To support this choice of the instrument, we present overidentification test statistics, such as Hansen test and Sargan test statistics, to show the validity of instrument. Hence, we conducted an ordered probit analysis with the fitted value from the first-stage regression to alleviate the possible reverse causality issue from the current year's business performance and Fintech borrowing.

Additionally, as a robustness check, we conduct Heckman ordered probit analysis, a two-step statistical approach. We first test whether there was a decrease in revenue and

profit from Fintech borrowing using probit analysis. Then, we further test whether the revenue remained unchanged or increased using another probit analysis. We thereby intend to correct for potential biases anticipated from non-randomly selected samples. Although our survey was conducted for random participants, MSMEs who answered, “Decreased revenue and profit” are relatively fewer than “Unchanged” and “Increased,” from Table 1, summary statistics. MSMEs that were successful during the pandemic might have a higher answering rate than firms that had losses. Therefore, we further conduct Heckman ordered probit to correct for the sample selection bias.

We first construct the first-stage equation as follows:

$$\ln(1 + Amount_i) = \alpha_0 + \alpha_1 \ln(Revenue_{i-1}) + \alpha_2 Subsequent_i + \alpha_3 OtherSource_i + \alpha_4 X_i + \alpha_5 FE_i + \vartheta_i. \quad (1)$$

$Amount_i$ is the amount borrowed from Fintech platform by each firm i in USD. To normalize the value and to include MSMEs that did not borrow any from the Fintech platform during the pandemic, we replace $Amount_i$ with the natural logarithm of $1 + Amount_i$. $Revenue_{i-1}$ is the previous year’s average revenue and we also normalize the value using natural logarithm. $Subsequent_i$ is the vector of subsequent borrowing. The vector includes the subsequent borrowing from the Fintech platform, bank, or either one of the sources. Each variable takes the value of one when firms have subsequently borrowed from the corresponding source, and zero otherwise. $OtherSource_i$ refers to the other sources of finance, including primary source of borrowing from a bank and government aid. When the firm’s primary source of borrowing was from a bank, or it received any financial aid from the government, the values take one, and zero otherwise. Vector X_i includes a series of control variables representing the firm characteristics including the sex, age, and education of the representative, and the duration of business. FE_i refers to the country fixed effects and ϑ_i is the error term.

Then, we conduct the second-stage equation as the following:

$$Y_i = \beta_0 + \beta_1 \ln(1 + \widehat{Amount}_i) + \beta_2 Subsequent_i + \beta_3 OtherSource_i + \beta_4 X_i + \beta_5 FE_i + \varepsilon_i. \quad (2)$$

Y_i refers to the vector of business performance for each firm i . The vector includes revenue changes and profit changes. Both variables range from one to three. When *Revenue* and profit decrease, they take the value of one. When they remain unchanged, they take the value of two. Lastly, when they increase, they take the value of three. We conduct ordered probit analysis with the fitted value of amount borrowed from the first stage equation ($\ln(1 + \widehat{Amount}_i)$)

Furthermore, we assume that there are external and internal factors that affect business performance of firms. The equation is as follows:

$$Y_i = \gamma_0 + \gamma_1 Ex_i + \gamma_2 In_i + \sigma_i. \quad (3)$$

Ex_i and In_i are the external and internal factors of each firm i , which are closely related to the profit and revenue change for the firms during the pandemic. The external vector includes i) increasing productivity, ii) launching a new product or service, iii) reducing costs, iv) paying off existing loans, v) a financial loss, vi) missing loan repayment to another provider, and vii) being refused a loan from a bank or credit from a supplier. Internal factors include i) changing system to expand customer base, and ii) changing system to attract media coverage. We conduct probit analysis on the positive and negative economic outcomes to understand the transmission mechanisms between Fintech borrowing and the business performances. The below equations describe the empirical equations to evaluate the mechanisms.

$$Ex_i = \delta_0 + \delta_1 \ln(1 + \widehat{Amount}_i) + \delta_2 Subsequent_i + \delta_3 OtherSource_i + \delta_4 X_i + \delta_5 FE_i + \mu_i \quad (4)$$

$$In_i = \zeta_0 + \zeta_1 \ln(1 + \widehat{Amount}_i) + \zeta_2 Subsequent_i + \zeta_3 OtherSource_i + \zeta_4 X_i + \zeta_5 FE_i + \varphi_i \quad (5)$$

The next section shows the empirical results using our empirical equations.

5. Empirical Results

This section describes the empirical results from our methodology. Table 2 shows the impact of Fintech borrowing on business performance, including revenue change and profit change. Column (1) in Table 2 refers to the first-stage equation results. The results indicate that the previous revenue positively affects Fintech borrowing with statistical significance. While analysis using instruments may alleviate endogeneity issues, we conduct additional robustness checks to test the validity of instrument. As Fintech adoption had already prevailed during the pandemic for ASEAN MSMEs, our sample is firms that already had a previous relationship with a Fintech platform. In other words, the results may be due to the samples that were already familiar with borrowing from Fintech platform. To check the selection bias related to Fintech, we first conduct and present the robustness check results using propensity score matching (PSM) analysis in Table 3. The results show that the significance levels for all variables are insignificant, and the bias percentage of all variables is lower than the absolute value of 5. The statistics indicate that, with or without Fintech borrowing, they do not

show much difference. In other words, the PSM results confirm that our results may not be heavily affected by sample selection bias. Additionally, we conducted the Hansen and Sargen test for overidentification test, to evaluate the validity of instrument. The Hansen and Sargen test show insignificant p-value results as specified in the bottom of Table 2. As we were not able to reject the null hypothesis of all overidentifying restrictions are valid, the results confirm the validity of the instrument.

The 2SLS results show that overall, the amount borrowed from Fintech platforms increased revenue and profits of the MSMEs during the pandemic. The more the firms borrow from the Fintech platform, the revenue and profit increase. As firms pivoted toward using Fintech platforms, their internal business transaction may have been simplified, and hence, revenue, and profit increased. On the other hand, subsequent borrowing from Fintech or bank, and financial aid from the government did not show statistically significant results. The results indicate that receiving government aid was not effective compared to Fintech borrowing. Improved efficiency along with customized to individual needs of lending options may be the strength of Fintech borrowing compared to government aid. As government aid was often provided i) during the most arduous timing of the pandemic, and ii) uniformly without considering for each firm's situation, Fintech borrowing seems to have been more effective compared to government aid during the pandemic.

However, the primary source of borrowing from bank decreased both revenue and profit for MSMEs. The estimated average marginal effects of Fintech borrowing on the probability of having increased revenue and profit is approximately 3.2 percentage points and 2.4 percentage points, respectively, whereas the estimated average marginal effect of bank borrowing on the probability of having decreased? revenue and profit is approximately 11.9 percentage points and 14.4 percentage points, respectively. While the primary source of borrowing from bank decreased the business performance for ASEAN MSMEs during the pandemic, Fintech borrowing increased the business performance, albeit with smaller magnitude. The results indicate that, as financial transactions abruptly moved from using banks to Fintechs, using a bank as a source of borrowing was not helpful to improve the business performance during COVID-19 pandemic. Additionally, if firm adhered to using bank borrowing even during the pandemic, it might have worsened the situation for it during the pandemic. In one case, by adopting Fintech borrowing, MSMEs in ASEAN were able to adapt to the pandemic situation well, overcoming the situation. In another case, it can also be seen that those firms that adhered to the usage of traditional borrowing from banking may have less possibilities of surviving, or increasing revenue and profit during the pandemic, compared to adapting to the usage of Fintech borrowing.

Table 2: Impact of Fintech Borrowing on Business Changes (Marginal Effects)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	First-stage	Revenue Decrease	Revenue Unchanged	Revenue Increase	Profit Decrease	Profit Unchanged	Profit Increase
Amount borrowed (Proxy)		−0.019*** [0.006]	−0.012*** [0.004]	0.032*** [0.010]	−0.015** [0.007]	−0.009** [0.004]	0.024** [0.010]
Subsequent	0.031 (0.188)	0.010 [0.028]	0.006 [0.018]	−0.016 [0.046]	0.015 [0.031]	0.009 [0.017]	−0.024 [0.048]
Subsequent (Fintech)	−0.054 (0.169)	−0.028 [0.028]	−0.018 [0.018]	0.046 [0.045]	−0.009 [0.029]	−0.005 [0.016]	0.014 [0.046]
Subsequent (Bank)	0.231 (0.181)	−0.018 [0.032]	−0.012 [0.021]	0.029 [0.053]	0.015 [0.031]	0.009 [0.018]	−0.024 [0.049]
Primary Source (Bank)	0.406* (0.188)	0.072** [0.033]	0.047** [0.021]	−0.119** [0.054]	0.092*** [0.034]	0.052*** [0.019]	−0.144*** [0.052]
Government Aid	−0.191 (0.160)	−0.000 [0.025]	−0.000 [0.016]	0.001 [0.041]	−0.006 [0.027]	−0.003 [0.015]	0.010 [0.042]
Female	−0.365* (0.153)	−0.004 [0.024]	−0.002 [0.015]	0.006 [0.039]	−0.007 [0.025]	−0.004 [0.014]	0.012 [0.039]
25–34	0.278 (0.236)	0.012 [0.038]	0.008 [0.024]	−0.020 [0.062]	0.023 [0.040]	0.013 [0.022]	−0.036 [0.062]
35–44	0.608* (0.253)	0.046 [0.041]	0.029 [0.027]	−0.075 [0.068]	0.027 [0.043]	0.015 [0.024]	−0.042 [0.068]
Over 44	0.875** (0.327)	0.150*** [0.051]	0.097*** [0.033]	−0.246*** [0.082]	0.133** [0.054]	0.075** [0.030]	−0.208** [0.083]
Vocational	0.478 (0.256)	−0.023 [0.039]	−0.015 [0.025]	0.038 [0.064]	0.031 [0.045]	0.018 [0.025]	−0.049 [0.070]
Undergraduate	0.481* (0.212)	−0.019 [0.031]	−0.012 [0.020]	0.031 [0.052]	0.068* [0.035]	0.038** [0.019]	−0.106** [0.054]
Postgraduate	0.682** (0.252)	−0.033 [0.037]	−0.021 [0.024]	0.054 [0.061]	0.019 [0.040]	0.011 [0.023]	−0.030 [0.063]
1–5 years business	−0.029 (0.174)	0.021 [0.028]	0.014 [0.018]	−0.035 [0.046]	0.002 [0.030]	0.001 [0.017]	−0.003 [0.047]
5–10 years business	−0.024 (0.225)	−0.024 [0.035]	−0.016 [0.023]	0.040 [0.058]	−0.024 [0.038]	−0.014 [0.021]	0.038 [0.059]
Previous Revenue (proxy)	0.433*** (0.045)						
Constant	2.805*** (0.621)						
Hansen Test		0.17			0.19		
Sargan Test		0.18			0.18		
Observations	612	612	612	612	612	612	612
Country FE	YES	YES	YES	YES	YES	YES	YES

Notes: Standard errors in parentheses. ***, **, * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Source: Authors' own calculations

Table 3: Robustness Check Using Propensity Score matching

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Revenue Change				Profit Change			
	Treated	Control	Bias Percentage	Significance	Treated	Control	Bias Percentage	Significance
Subsequent	0.544	0.683	−4.8	0.335	0.543	0.645	−4.2	0.345
Subsequent (Fintech)	0.265	0.263	0.7	0.924	0.265	0.248	0.8	0.876
Subsequent (Bank)	0.107	0.154	−3.3	0.562	0.107	0.145	−2.3	0.5
Primary Source (Bank)	0.001	0.032	−1.7	0.8	0.001	0.003	−1.1	0.7
Government Aid	0.391	0.493	−5.4	0.3	0.391	0.425	−5.1	0.2
Female	0.684	0.560	3.7	0.545	0.684	0.650	1.5	0.55
25–34	0.601	0.552	1.2	0.603	0.604	0.456	2.3	0.6
35–44	0.605	0.501	2.3	0.666	0.605	0.578	1.5	0.7
Over 44	0.084	0.053	2.6	0.565	0.08	0.06	1.4	0.5
Vocational	0.158	0.245	−4.7	0.445	0.158	0.251	−4.9	0.432
Undergraduate	0.186	0.201	−1.9	0.798	0.186	0.231	−2.1	0.787
Postgraduate	0.567	0.496	0.3	0.976	0.567	0.551	0.5	0.998
1–5 years business	0.693	0.714	−0.7	0.9	0.247	0.278	−1.1	0.976
5–10 years business	0.13	0.121	0.9	0.89	0.13	0.11	1.1	0.9
Country FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors in parentheses.

Source: Authors' own calculations

Table 4 shows the relationship between Fintech platform borrowing and the channels of firm activities which are external and internal factors. The amount borrowed from the Fintech platform contributed to launching new products or services, paid off existing loans, and

decreased financial loss for external factors, and changed system through expanding customers for organizational factor, albeit with low significance level. Fintech borrowing contributed to the business performance through expanding customers, launching new goods or services, paying off existing loans, and reducing financial losses. Additionally, having primary source of banking contributed to the business performance of MSMEs in ASEAN during the pandemic through launching new products or services, paying off existing loans, and reducing financial losses, which are in common with the impact from Fintech borrowing, except for expanding customer. Although Fintech borrowing contributed to the business performance through the aforementioned four channels, launching new products or services, paying off existing loans and reducing financial losses were all also channels of increasing business performance for MSMEs with primary source of borrowing from a bank.

What is unique is expanding customers through Fintech borrowing, which is an internal factor. Three factors from external factors, such as launching new goods, external paid off, and deviating from financial loss show statistically significant result for both from Fintech borrowing and the primary source of banking. However, expanding customer through Fintech borrowing uniquely affects business performance during the pandemic for ASEAN MSMEs. Using internal decision to change the group first, and by borrowing more from a Fintech platform during pandemic, ASEAN MSMEs increased revenue and profit through expanding customers. In other words, those firms borrowing from Fintech platforms were more successful in changing the organizational strategy for sales. Customer expanded through either increased sales from incumbent goods (intensive margin) or the increased sales of new goods (extensive margin). As the firms borrow from Fintech platforms that meet individually tailored needs, compared to the borrowing from traditional sources of banking, they were able to invest more in their products and services to upgrade the quality of incumbent goods or diversify the goods for increased utility. Upgrade in quality would attract incumbent consumers that wanted higher-quality goods, and diversified goods would lure new consumers that wanted different goods from the market. Thus, Fintech borrowing contributed to the business performance of firms through customer expansion.

Table 4: Effect of amount borrowed from Fintech Platform on the Channels of Business Performance (Marginal Effects)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	External							Internal	
	Productivity	Launched new	Reduced costs	Paid off	Financial Loss	Missed Loan Re-payment	Refusal from Bank	Expand Customer	Attract Media
Amount borrowed (Proxy)	0.015 (0.010)	0.017* (0.010)	0.006 (0.009)	0.020* (0.011)	-0.023** (0.010)	0.008 (0.009)	-0.001 (0.009)	0.021* (0.011)	0.008 (0.008)
Subsequent	-0.081* (0.049)	0.054 (0.051)	-0.004 (0.042)	0.035 (0.050)	0.015 (0.050)	0.071 (0.046)	0.066 (0.046)	0.047 (0.051)	0.046 (0.043)
Subsequent (Fintech)	0.005 (0.047)	0.013 (0.048)	0.037 (0.038)	0.082* (0.047)	0.145*** (0.046)	0.013 (0.042)	0.021 (0.043)	0.031 (0.049)	0.067* (0.038)
Subsequent (Bank)	0.068 (0.053)	0.017 (0.054)	0.073* (0.042)	-0.009 (0.053)	-0.050 (0.052)	0.046 (0.046)	0.057 (0.047)	0.049 (0.054)	0.072* (0.040)
Primary Source (Bank)	-0.038 (0.055)	0.128** (0.059)	-0.044 (0.047)	0.112** (0.056)	-0.111** (0.057)	0.043 (0.049)	-0.055 (0.053)	0.029 (0.057)	0.021 (0.044)
Government Aid	0.023 (0.043)	0.079* (0.044)	-0.020 (0.036)	0.013 (0.043)	0.009 (0.043)	0.023 (0.038)	0.003 (0.039)	-0.022 (0.044)	-0.027 (0.036)
Female	-0.034 (0.041)	0.017 (0.042)	0.013 (0.034)	0.002 (0.041)	0.002 (0.042)	-0.082** (0.035)	-0.010 (0.038)	-0.034 (0.043)	-0.002 (0.034)
25-34	0.010 (0.068)	0.048 (0.069)	-0.061 (0.052)	-0.036 (0.067)	0.058 (0.067)	0.047 (0.061)	-0.035 (0.060)	-0.182*** (0.069)	-0.025 (0.054)
35-44	-0.042 (0.073)	-0.014 (0.074)	-0.076 (0.058)	-0.049 (0.072)	0.062 (0.072)	0.012 (0.066)	-0.010 (0.065)	-0.239*** (0.074)	-0.077 (0.059)
Over 44	-0.090 (0.086)	-0.006 (0.088)	-0.146* (0.074)	-0.127 (0.088)	0.005 (0.086)	0.019 (0.078)	-0.146* (0.080)	-0.150* (0.088)	-0.035 (0.067)
Vocational	-0.098 (0.072)	0.010 (0.076)	-0.114* (0.065)	0.068 (0.074)	0.043 (0.072)	-0.010 (0.066)	0.044 (0.068)	0.002 (0.076)	0.033 (0.064)
Undergraduate	-0.056 (0.057)	0.105* (0.059)	-0.014 (0.048)	0.087 (0.058)	0.049 (0.057)	-0.016 (0.051)	0.006 (0.053)	0.027 (0.060)	0.057 (0.050)
Postgraduate	-0.100 (0.066)	0.067 (0.068)	0.048 (0.054)	0.104 (0.067)	-0.062 (0.068)	0.000 (0.059)	0.112* (0.060)	0.083 (0.068)	0.085 (0.057)
1-5 years business	0.033 (0.050)	0.015 (0.051)	-0.028 (0.040)	-0.073 (0.050)	-0.003 (0.049)	-0.047 (0.044)	-0.035 (0.045)	0.000 (0.052)	-0.021 (0.041)
5-10 years business	0.060 (0.061)	-0.158** (0.062)	-0.035 (0.050)	-0.100 (0.062)	-0.007 (0.061)	-0.107* (0.055)	-0.079 (0.056)	-0.008 (0.064)	-0.024 (0.047)
Observations	612	612	612	612	612	612	612	612	612
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Standard errors in parentheses. ***, **, * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Source: Authors' own calculations

Lastly, we conduct a Heckman Ordered Probit Analysis as a robustness check to test for sample selection bias, typically on the business performance of MSMEs during the pandemic. Columns (1) and (3) are selection of samples whether the revenue or profit of firms decreased or not. Both results show a positive coefficient for Fintech borrowing and negative coefficient for primary sources as bank. Positive coefficients indicate that revenue and profit were unchanged or increased, whereas negative coefficients indicate that revenue and profit decreased. The results correspond with our previous results using 2SLS. Next, Columns (2) and (4) are the marginal effects from the Heckman Ordered Probit Analysis. The results confirm that Fintech borrowing increased revenue and profit compared to being unchanged, and the primary source of bank decreased revenue and profit compared to being unchanged. The results confirm the 2SLS results as well. Hence, our empirical analysis suggests that Fintech borrowing during the pandemic increased the business performance of MSMEs in ASEAN. And this may be explained through Fintech borrowing's effects on expanding customers.

6. Conclusions and Policy Implications

This research investigated the relationship between Fintech borrowing and business performance changes of MSMEs in Indonesia, Malaysia, the Philippines, Singapore, and Thailand, during the pandemic. We mitigated the possible endogeneity issue by conducting a 2SLS analysis to show the linkage between Fintech borrowing and business performance of MSMEs. The Hansen and Sargen tests confirmed the validity of instrument. We showed that the issue of sample selection bias was not significant using PSM analysis. We then distinguished the channels of business performance that are closely related to the business performance and empirically tested with the effect of Fintech borrowing using probit analysis. We additionally conducted Heckman Ordered Probit analysis as a further robustness check to control sample selection bias. Our results indicate that, while having a bank as a primary source of borrowing decreased revenue and profit during the pandemic for ASEAN MSMEs, borrowing from Fintech increased revenue and profit. Those who successfully adapted to borrowing from Fintech platforms increased the probability of improving their performance during the pandemic. Additionally, our results suggest that internal system changes through expanding the customers, would improve the business performance, which were excluded from the primary source as banking.

This research inevitably has some limitations. First, due to data availability, all sample firms are using at least some Fintech platforms as finance borrowing. The limitation stems from the nature of the survey as the survey participants were existing borrowers from Fintech platforms. Second, the cross-sectional nature of the data limits our analysis. Future aggregation of panel survey data would be more advantageous for the analysis. Future sur-

veys of Fintech borrowing may complement the data availability issue and fill in the gaps in the limitation for this research.

Nevertheless, our findings contribute to the past literature as follows. We confirmed that, similar to larger firms in developed nations, MSMEs in the developing nations of Indonesia, Malaysia, the Philippines, Singapore, and Thailand were positively affected by Fintech borrowing. Adaptation to financial technology boosted the business performance of ASEAN MSMEs during the pandemic. Our analysis also included other sources of financial borrowing aside from Fintech borrowing. By doing so, we were able to compare the impact of Fintech borrowing with other sources of financial assistance. Last but not least, our analysis using external and internal channels shows that internal strategies from the business improved the business performance from Fintech borrowing, compared to the traditional usage of bank loans specifically for ASEAN MSMEs during the pandemic. This may suggest that firms need to focus more on system changes of the firms when considering for higher business performance.

Our research further suggests policy recommendations across the ASEAN region. Past literature suggests the promotion of Fintech platforms for upgrading the economy. Fu and Mishra (2022) showed that the presence of Fintech platforms positively influenced Indonesia where the firms could compete for offering better financial services. Naz *et al.* (2024) points out privacy issues or inequalities issue as a problem of implementing Fintech in Middle East and North Africa (MENA) region. They, however, evaluate the prospects of Fintech to increase the employment opportunities, financial outreach, and networking. Vasneka *et al.* (2021) argues that Fintech may ease consumption through efficient lending systems and payments which could help the economy with a less structured work environment. This will eventually increase financial inclusion for individuals to participate easily in financial services. Likewise, our empirical results suggest that utilization of Fintech platforms, particularly increase in Fintech borrowing may directly influence the ASEAN MSMEs' revenue and profit, leading to positive circulation of finance to recover the economy from the pandemic. Particularly, a way to expand customers through Fintech borrowing is necessary to effectively contribute to the business performance of ASEAN MSMEs.

As governments reassess their policy and regulatory approaches to Fintech, it is important to keep customer needs at the center of all discussion. The results of this study provide a comprehensive analysis of the key opportunities and challenges facing the usage of Fintech by the small firms in ASEAN, and how evolving regulation and policy can further enable growth of the Fintech ecosystem. While increasing the opportunity of accessing Fintech platforms for firms, policy related to protecting the customers is necessary. This can translate into higher levels of financial inclusion across the region.

Acknowledgement

Funding: There was no funding, either externally or internally, towards this study.

Conflicts of interest: The authors hereby declare that this article was not submitted no published elsewhere.

AI usage statement: The authors confirm that no artificial intelligence (AI) or AI-assisted tools were used in the creation of this manuscript.

References

- Asian Development Bank (2020). Asia Small and Medium-Sized Enterprise Monitor 2020: Vol. I (Issue October). Asian Development Bank, October 2020. Accessed December 6, 2022. Available from URL: <https://www.adb.org/publications/asia-sme-monitor-2021-country-regional-reviews>
- Bachmann, A., et al. (2011). Online Peer-to-Peer Lending - A Literature Review. Journal of Internet Banking and Commerce, Vol. 16(2).
- Balyuk, T. (2019). Financial Innovation and Borrowers: Evidence from Peer-to-Peer Lending. Rotman School of Management Working Paper No. 2802220.
- Balyuk, T., Berger, A. N., and Hackney, J. (2022). What is Fueling Fintech Lending? The Role of Banking Market Structure. Industrial Organization: Empirical Studies of Firms & Markets eJournal.
- Barkley, B., and Schweitzer, M. E. (2020). The rise of Fintech lending to small businesses: Businesses' perspectives on borrowing. FRB of Cleveland Working Paper No. 20-11.
- Beaumont, P., Tang, H., and Vansteenbergh, E. (2021). The role of Fintech in small business lending. Accessed November 24, 2022. Available from URL: <http://dx.doi.org/10.2139/ssrn.4260842>
- Beaumont, P., Tang, H., & Vansteenbergh, E. (2022). Collateral effects: the role of FinTech in small business lending. In proceedings of the EUROFIDAI-ESSEC Paris December Finance Meeting.
- Beck, T. (2019). Fintech and financial inclusion: Opportunities and pitfalls. ADBI Working Paper Series, Issue No. 1165.
- Cambridge Centre for Alternative Finance (2021). The 2nd Global Alternative Finance Market Benchmarking Report: Trends, Opportunities and Challenges for Lending, Equity and Non-Investment Alternative Finance Models. Cambridge: University of Cambridge Judge Business School. Accessed January 6, 2022. Available from URL: <https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/the-2nd-global-alternative-finance-market-benchmarking-report/>
- Carbó-Valverde, S., Cuadros-Solas, P. J., & Rodríguez-Fernández, F. (2022). Entrepreneurial, institutional and financial strategies for FinTech profitability. Financial Innovation, 8(1), 15.
- CCAF and ADBI (2022). The ASEAN Access to Digital Finance Study. Cambridge Centre for Alternative Finance and the Asian Development Bank Institute

- Coakley, J., and Huang, W. (2020). P2P lending and outside entrepreneurial finance. *The European Journal of Finance*. Available from URL: <https://doi.org/10.1080/1351847X.2020.1842223>
- Cornaggia, J., Wolfe, B. and Yoo, W. (2018). Crowding Out Banks: Credit Substitution by Peer-To-Peer Lending. Available from URL: <http://dx.doi.org/10.2139/ssrn.3000593>
- Crouzet, N., Gupta, A., & Mezzanotti, F. (2023). Shocks and technology adoption: Evidence from electronic payment systems. *Journal of Political Economy*, 131(11), 3003-3065.
- Dai, Lili and Han, Jianlei and Shi, Jing and Zhang, Bohui, *Fintech Lending and Debt Spiral* (2025). Available at SSRN: <https://ssrn.com/abstract=5165625> or <http://dx.doi.org/10.2139/ssrn.5165625>
- Deloitte (2015). Digital banking for small and medium-sized enterprises: Improving access to finance for the underserved. Join report in collaboration with Visa. Accessed December Available from URL: <https://www2.deloitte.com/content/dam/Deloitte/sg/Documents/financial-services/sea-fsi-digital-banking-small-medium-enterprises-noexp.pdf>
- De Roure, Calebe and Pelizzon, Lorian and Thakor, Anjan V. (2018). P2P Lenders versus Banks: Cream Skimming or Bottom Fishing? SAFE Working Paper No. 206, Michael J. Brennan Irish Finance Working Paper Series Research Paper No. 18-13.
- Eça, A., Ferreira, M. A., Prado, M. P., & Rizzo, A. E. (2022). The real effects of Fintech lending on SMEs: Evidence from loan applications. ECB Working Paper No. 2022/2639.
- Emekter, R. et al. (2015). Evaluating credit risk and loan performance in online Peer-to-Peer (P2P) lending. *Applied Economics*, Vol. 47(10).
- FAO. (n.d.) Chapter 7 – Sources of Finance. Accessed on March 5, 2025. Available from URL: <https://www.fao.org/4/w4343e/w4343e08.htm>
- Fu, J., & Mishra, M. (2022). Fintech in the time of COVID– 19: Technological adoption during crises. *Journal of Financial Intermediation*, 50, 100945.
- Fuster, A. et al. (2019). The Role of Technology in Mortgage Lending. *The Review of Financial Studies*, Vol. 32(5), 1854-1899.
- Ghosh, P., Vallee, B., and Zeng, Y. (2021, August). Fintech lending and cashless payments. In *Proceedings of Paris December 2021 Finance Meeting EUROFIDAI-ESSEC*.
- Hansen, G. S., & Wernerfelt, B. (1989). Determinants of firm performance: The relative importance of economic and organizational factors. *Strategic management journal*, 10(5), 399-411.
- Higgins, S. (2019). Financial technology adoption. Northwestern University: Kellogg School of Management.
- Huang, S. (2022). Does Fintech improve the investment efficiency of enterprises? Evidence from China's small and medium-sized enterprises. *Economic Analysis and Policy*, Vol. 74, 571-586.

- Iwasaki, K. (2018). Emergence of Fintech Companies in Southeast Asia-Rising Hopes of a Solution to Financial Issues-Summary. *Pacific Business and Industries*, Vol. XVIII(68), 2-32.
- Jagtiani, J. and Lemieux, C. (2018). Do Fintech lenders penetrate areas that are underserved by traditional banks? *Journal of Economics and Business*, Vol. 100, 43-54.
- Lin M., Prabhala N. R., and Viswanathan, S. (2013). Judging borrowers by the company they keep: friendship networks and information asymmetry in online peer-to-peer lending. *Management Science*. Vol. 59(1), 17-35.
- Lu, L. (2018). Promoting SME Finance in the Context of the Fintech Revolution: A Case Study of the UK's Practice and Regulation. *Banking and Finance Law Review*, Vol. 33(3), 317-343.
- Marsan, G. A., & Sabrina, L. M. (2020). ASEAN MSMEs in a COVID-19 World. *ERIA MSMEs Talks*, 1-5.
- Matt, D. T., Modrák, V., & Zsifkovits, H. (2021). Implementing Industry 4.0 in SMEs: Concepts, Examples and Applications (p. 429). Springer Nature.
- Naz, F., Karim, S., Houcine, A., & Naeem, M. A. (2024). Fintech growth during COVID-19 in MENA region: current challenges and future prospects. *Electronic Commerce Research*, 24(1), 371-392.
- Otoritas Jasa Keuangan (2020). Supporting Financial inclusion for MSMEs Through Fintech. Otoritas Jasa Keuangan/Financial Supervisory Agency of Indonesia with the support of Asian Development Bank, December 2020 [MM1] Accessed December 6, 2022. Available at <https://ojk.go.id/id/berita-dan-kegiatan/publikasi/Pages/Financial-Inclusion-for-MSMEs-Through-Fintech.aspx>
- Papadopoulos, T., Baltas, K. N., & Balta, M. E. (2020). The use of digital technologies by small and medium enterprises during COVID-19: Implications for theory and practice. *International journal of information management*, 55, 102192.
- Pierrakis, Y. (2019). Peer-to-peer lending to businesses: Investors' characteristics, investment criteria and motivation. *The International Journal of Entrepreneurship and Innovation*, Vol. 20(4), 239-250.
- Schweitzer, M., and Barkley, B. (2017). Is' Fintech' Good for Small Business Borrowers? Impacts on Firm Growth and Customer Satisfaction. FRB of Cleveland Working Paper No. 17-01.
- Segal, M. (2015). Peer-to-Peer Lending: A Financing Alternative for Small Businesses. The U.S. SBA Office of Advocacy, Issue Brief No. 10.
- Singapore Fintech Association (2019). Fintech in ASEAN: From Start-up to Scale-up (2019). Accessed on March 5, 2025. Available from URL: <https://singaporefintech.org/news/Fintech-in-asean-from-start-up-to-scale-up-2019-report-was-released/>
- Singapore Fintech Association (2021). Fintech in ASEAN 2021. Accessed on March 5, 2025. Available from URL: <https://singaporefintech.org/news/Fintech-in-asean-2021/>
- The ASEAN Secretariat (2024). Development of Micro, Small, and Medium Enterprises in ASEAN (MSME). Accessed on March 5, 2025. Available from URL: <https://asean.org/our-communities/economic-community/resilient-and-inclusive-asean/development-of-micro-small-and-medium-enterprises-in-asean-msme/>

United Overseas Bank (2020). Fintech in ASEAN 2020: Get UP, Reset, Go! Accessed on March 5, 2025. Available from URL:

<https://www.uobgroup.com/tehecosystem/reports/Fintech-in-asean-2020.page?>

Vasenska, I., Dimitrov, P., Koyundzhiyska-Davidkova, B., Krastev, V., Durana, P., & Poulaki, I. (2021). Financial transactions using fintech during the COVID-19 crisis in Bulgaria. *Risks*, 9(3), 48.

Widiyasari, V., & Widjaja, H. (2021, January 20). This new approach to credit scoring is accelerating financial inclusion in emerging economies. The World Economic Forum, The Devos Agenda 2021. Accessed on December 7, 2022. Available from URL: <https://www.weforum.org/agenda/2021/01/this-new-approach-to-credit-scoring-is-accelerating-financial-inclusion/>

World Economic Forum (2022). ASEAN Digital Generation Report: Digital Financial Inclusion. Insight report in collaboration with Sea, December 2022. Available from URL: https://www3.weforum.org/docs/WEF_ASEAN_Digital_Generation_Report_2022.pdf

Copyright: © 2025 by the author(s). Licensee Prague University of Economics and Business, Czech Republic. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution License (CC BY NC ND 4.0).