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Financing Choices in Time of Crisis: Trade Credit and Bank Loan in Thailand's SMEs Amidst Pandemic Recession

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Abstract

After the Great Recession of 2008, the world is experiencing another major recession in 2020. This recession is primarily caused by the global impact of the COVID-19 pandemic, leading to widespread economic downturns. This has a significant impact not only on individuals but also on small and medium-sized enterprises (SMEs). Many small and medium-sized enterprises are facing unprecedented challenges, such as reduced consumer demand and disrupted supply chains, resulting in financial constraints. It is crucial for SMEs to adapt quickly and seek financial assistance. This paper investigates how SMEs in Thailand made financing decisions between two major funding sources: trade credit and bank loans. The result has shown that there is a substitute relationship between trade credit and bank loans. Additionally, these results suggest that SMEs in Thailand tend to prioritise trade credit over bank loans when profitability is high. Moreover, the collateral has a positive correlation with the use of bank loans in SMEs, in contrast with the cash holding level, which has a significantly negative correlation with the use of bank loans. Finally, younger firms may face more challenges in accessing both traditional bank financing and trade credit from suppliers compared to established businesses. Overall, the study suggests that various factors such as profitability, collateral, and cash holding levels play a significant role in determining SMEs' financing decisions. Understanding these relationships can help businesses make more informed choices when seeking funding.

Keywords

Trade credit, Bank Loan, Small and Medium Enterprises, Pandemic Recession

1. Introduction

With the great financial crisis and the pandemic recession, the world has experienced two severe economic crises within just over a decade. Both crises have led to disruptions in the global economy and have affected SMEs' access to finance (Derado & Pejkovi, 2023; Wu 2023). In terms of similarities, the great financial crisis in 2008 and the COVID-19 crisis in 2020 have resulted in increased costs for SMEs, such as rising labor, capital, and raw material costs (Caporale et al., 2023). Additionally, both crises have led to a decrease in demand and sales for SMEs, posing further challenges for their business finances (Durst et al., 2022). However, there are also differences between the two crises. According to Vasilescu and Sitnikov (2022), the pandemic recession has resulted in more frequent and significant losses for enterprises, but a higher percentage of these losses can be returned to profitability than during the 2008 financial crisis. A study conducted by García-Pérez-de-Lema, et al. (2022) examined the financial issues that SMEs faced during the pandemic. These challenges included a substancial decline in sales, which made it difficult to obtain financing, more stringent payment terms imposed by suppliers, and a state of investment paralysis. In times of crisis, SMEs have been the object of different empirical studies due to the increased difficulties they face in resorting to sources of financing. Access to credit has become increasingly difficult for companies, particularly those accessing the banking system for the first time. OECD (2015) has shown that SMEs often struggle to meet the strict requirements and collateral demands of traditional banks, leading to a higher likelihood of bank loan rejections. Additionally, the pandemic exacerbated these challenges as banks became more cautious about lending due to economic uncertainty. Given the severe constraints they faced, many companies resorted to alternative sources, specifically trade credit, which is quick and simple but comes at a high opportunity cost. Hence, this study aims to investigate how SMEs in Thailand make their financing choices, which factors play significant roles in affecting their use of trade credit and bank loans, and what the relationship is between trade credit and bank loans. This article uses small and medium enterprise (SMEs) financial data from various industries in Thailand. The sample has 496 observations from 124 enterprises between January 1, 2019 and December 31, 2022. To investigate the determinants of trade credit and bank loans in SMEs, the Generalized Method of Moments (GMM) with panel data has been used. In 2020, when the pandemic's economic impact was the highest, small and medium-sized enterprises in most industries reduced their trade credit use due to uncertainty and financial distress. This made firms more credit-conscious. Similarly, bank loan usage varies by sector, but is falling in the majority of sectors. The result has shown that there is a substitute relationship between trade credit and bank loans. Additionally, these results suggest that SMEs in Thailand tend to prioritise trade credit over bank loans when profitability is high. Liquidity, inventory turnover, cash holding and size are not associated to the use of trade credit in SMEs. In the context of bank

loans, not only trade credit has a significantly negative correlation with the use of bank loans in SMEs, but also cash holding and age. Moreover, the collateral has a positive correlation with the use of bank loans in SMEs. Finally, younger firms may face more challenges in accessing both traditional bank financing and trade credit from suppliers compared to established businesses.

2. Literature Review and Hypothesis Development

2.1. Trade Credit and Bank Loan

Trade credit is a form of short-term financing that occurs between buyers and suppliers in the production process. It is a system where suppliers of intermediate goods and services provide financing to firms in the form of credit, allowing them to purchase goods and services without immediate payment (Bocola & Bornstein, 2023; Shah et al., 2022). Trade credit and bank loans are similar in their role as essential sources of financing for SMEs. However, trade credit offers some advantages over bank credit for SMEs. Unlike bank credit, trade credit does not require collateral or extensive documentation, making it more accessible to businesses with limited assets or credit history. Additionally, trade credit often provides more flexible repayment terms, allowing businesses to negotiate payment schedules that align with their cash flow needs. In certain situations, trade credit can be used as a substitute for bank loans, particularly when firms face difficulties accessing relationship lending from banks (Lin & Qiao, 2020). Chen et al. (2019) also report that firms decreased their reliance on trade credit after the easing of bank credit. The finding also indicates that bank credit is more advantageous for short-term financing in comparison to trade credit. In accordance with the study by Bertrand and Murro (2018), there is evidence that Italian manufacturing SMEs tend to retain a larger proportion of trade credit in their loans. This suggests that SMEs are using trade credit as a substitute for their lack of relationship lending credit.

On the contrary, Cosci et al. (2019) argued that trade credit and bank credit are not completely substitutes, and trade credit does not effectively alleviate financial constraints for credit-constrained firms in Italy. The analysis in their paper demonstrates that the substitutability between trade credit and short-term bank credit is limited to net lenders, implying that trade credit and bank credit cannot be substituted for all enterprises. Furthermore, numerous studies have examined the relationship between trade credit and bank loans and discovered that trade credit is used not only as a substitute but also as a complement to bank loans. Engemann et al. (2014) investigate the relationship between trade credits and bank credits for exporting firms. They find that trade credits and bank credits are substitutes for financially unconstrained firms but complements for financially constrained exporters. According to the report from the Reserve Bank of Australia conference, Lars and Stefan (2023) conclude that substitution and complementary relationships are almost equally likely over the entire SMEs sample from France, Germany, Italy, Spain, and the United Kingdom from 2006

to 2011. However, there is substantial variation across countries and over time. They also discovered that the likelihood of a firm exhibiting a substitution relationship decreased significantly during the financial crisis. Wang et al. (2021) revealed that trade credit and bank credit are substitutes for public firms that have easy access to cheap external finance. In contrast, trade credit and bank credit are complements for private firms that have limited access to alternative financing resources. These findings suggest that the relationship between trade credit and bank loans is complex and may vary depending on the specific circumstances of each firm. Therefore, this study aims to investigate the connection between these two primary sources of financing for SMEs in Thailand throughout the recent pandemic economic downturn.

Hypothesis 1 (H_1): There is a substitute relationship between the use of trade credit and bank loans in SMEs during pandemic recession.

2.2. Profitability

According to the financing advantage theory developed by Petersen & Rajan (1997), suppliers have an information advantage over traditional financial institutions. This theory suggests that suppliers may have better information about the creditworthiness and financial health of their buyers compared to financial institutions. As a result, suppliers may be more willing to extend trade credit to firms, especially small firms with limited access to capital markets like SMEs, as they can leverage their information advantage to make informed lending decisions. Hence, the more profitable enterprises are, the greater their access to trade credit. The studies cited above also highlight the importance of considering individual firm characteristics such as profitability, liquidity, size, and age when studying the substitutability between trade credit and bank loans. Profitability is one of the key factors that influences the availability and cost of bank loans. When a company demonstrates strong profitability, it enhances its creditworthiness and reduces the perceived risk for lenders. This allows businesses to negotiate more favorable financing terms and access larger amounts of credit to support their growth. According to Pinto et al. (2023), profitability has a negative impact on bank loan utilization but no impact on trade credit. Profitability affects the availability of cheaper sources of funds for a firm. If a firm is highly profitable, it may have easier access to other forms of financing, reducing the need for trade credit (Eboli & Toto, 2019). Moreover, Al-Eitan et al. (2023) discovered a significant correlation between accounts payable and profitability in small and medium-sized manufacturing enterprises in Jordan. These findings imply that the correlation between profitability and credit utilization may differ depending on the type of financing under consideration.

Hypothesis 2a (H_{2a}): Small and medium-sized enterprises (SMEs) with higher profitability use more trade credit.

Hypothesis 2b (H_{2b}): Small and medium-sized enterprises (SMEs) with higher profitability use more bank loan.

2.3. Liquidity

The liquidity of small and medium-sized enterprises (SMEs) has an impact on their use of trade credit and bank credit. Firms with more asset liquidity tend to use less trade credit (Pinto et al., 2023). According to the Bank for International Settlements (Boissay et al. 2020), trade credit becomes a substitute source of liquidity during financial crises as bank credit weakens. Firms suffering from credit constraints due to liquidity shocks will be able to get more trade credit in place of bank debt (Lars & Stefan, 2023). This is because suppliers are more willing to extend credit to maintain their business relationships and ensure continued sales. Additionally, the availability of trade credit can help SMEs bridge the gap between receiving payments from customers and paying their own suppliers, thereby improving their cash flow position during challenging economic times. Moreover, McGuinness & Hogan (2014) found that trade credit became increasingly important for financially vulnerable SMEs that were less liquid and relied heavily on short-term bank financing. Consequently, research on liquidity and the dynamics between trade credit and bank credit can contribute to a greater comprehension of how SMEs handle cash flow during challenging economic conditions.

Hypothesis 3a (H_{3a}): Small and medium-sized enterprises (SMEs) with less liquidity use more trade credit.

Hypothesis 3b (H_{3b}): Small and medium-sized enterprises (SMEs) with less liquidity use more bank loan.

2.4. Collateral

Beside profitability and liquidity, access to sufficient bank credit is crucial for SMEs, as their ability to finance investments from their own cash holdings is often limited. Collateral assets can serve as a form of security for banks, potentially increasing SMEs' access to bank credit (Kautonen et al., 2020). However, the availability and quality of collateral assets may vary among SMEs and affect their ability to secure bank credit. According to the Federal Reserve report (Gupta et al., 2021), an increase in collateral values leads to higher growth in lending, particularly for firms pledging real estate collateral. This suggests that SMEs with valuable collateral assets, such as real estate, may have an advantage in accessing bank credit compared to those without such assets. In accordance with the study by Cerqueiro et al. (2011), they found that collateral determines borrower quality, loan terms, access to credit, and bank monitoring of business-term loans. A reduction in collateral leads to higher interest rates, worse quality assessment by the bank, and a decrease in the supply of credit. Understanding how collateral influences the availability of credits can help stakeholders make informed decisions regarding credit extension and risk mitigation strategies. Hence, this paper aims to study the relationship between collateral and the use of trade credit and bank loans in the context of SMEs.

Hypothesis 4 (H_4): The collateral has a positive impact on the use of bank loans in small and medium-sized enterprises (SMEs).

2.5. Inventory Management

In the case of trade credit, trade credit typically does not require collateral, making it a more accessible form of financing for SMEs than bank loans. While trade credit itself doesn't involve collateral in the traditional sense, suppliers may consider factors such as the buyer's reputation and financial strength before offering favorable credit terms (Bocola & Bornstein, 2023). Additionally, the rights to collateral value of products sold by suppliers can mitigate credit risk, leading to an increase in the amount and duration of trade credit offered (Costello, 2019). In the words of Chen et al. (2023), inventory has a significant impact on how SMEs use trade credit. Firms with higher levels of inventory and inventory turnover are more likely to have trade credit, which allows them to meet their transaction requirements. In addition, as inventory turnover or reorder points decrease in firms with low liquidity, their demand for trade credit rises, and firms demand more trade credit when the accounts payable payment period is long (Yazdinejad & Jokar, 2019). This suggests that inventory management plays a crucial role in determining the trade credit needs of SMEs, as it directly affects their liquidity and ability to meet transaction requirements efficiently. Therefore, understanding the relationship between inventory levels, turnover, and trade credit usage is essential for optimizing financial strategies in small businesses.

Hypothesis 5 (H_5): The efficient management of inventory has a positive impact on the use of trade credit in small and medium-sized enterprises (SMEs).

2.6. Additional Variables

Furthermore, this research also shed light on how the firm's age, size, and cash holdings affect trade credit and bank loans. Low cash balances could encourage SMEs to extend their trade payables (Zubair et al., 2020). This is because SMEs with low cash balances may experience financial constraints and have limited access to bank financing (Chen & Yan, 2020). As a result, they may rely on trade credit as a source of funding to meet their payment obligations to suppliers (Bussoli & Marino, 2018). Moreover, Larger or older firms typically have more bargaining power and financial capital, which allows them to negotiate advantageous trade credit terms with both suppliers and banks. However, smaller firms, especially during periods of financial crisis, tend to rely more on trade credit as a source of financing (Pinto et al., 2023). In line with the study by McGuinness and Hogan (2014), younger companies tend to rely more on trade credit due to their restricted access to bank financing and higher financial limitations. On the other hand, older or mature firms are expected to use less trade credit and have easier access to bank finance, leading to a negative relationship between trade

credit and the age of the firm. Conversely, Coleman (2005), conducted prior to the financial crisis, observed that larger companies were more inclined to use trade credit. Newer companies faced a higher probability of being denied trade credit and were also more prone to making late payments. This was also the case for companies with a history of credit issues and those burdened with significant levels of debt. These findings suggest that the use of trade credit and bank credit may vary depending on the company's characteristics, including size and age. Furthermore, these characteristics may also impact the company's ability to secure favorable credit terms and conditions.

To test these hypotheses, the study will collect data from a sample of SMEs in Thailand and analyze the correlation between their usage of trade credit and bank loans during the pandemic recession. Additionally, the study will examine any potential factors that may influence the substitution or complementarity between these two sources of financing, such as firm size, industry sector, and financial health. By providing empirical evidence on the substitutability or complementarity between trade credit and bank loans for SMEs during economic downturns, this research aims to contribute to the existing literature on SME financing and inform policymakers and practitioners in their decision-making processes.

3. Data and Methodology

3.1. Data

The data used in this paper includes small and medium enterprises (SMEs) financial data from various industries, excluding financial sectors, collected over a four-year period from 2019 to 2022. The Market for Alternative Investment (MAI) has provided this extensive dataset to allow for a thorough analysis of trade credit and bank loans within the SME sector. MAI is a stock exchange for SMEs that was established by the Stock Exchange of Thailand (SET). There are 8 main sectors in the small and medium enterprises market in Thailand, including Agro & Food industry (AGRO), Consumer products (CONSUMP), Financials (FINCIAL), Industrial (INDUS), Property & Construction (PROPCON), Resources (RESOURC), Services (SERVICE) and Technology (TECH). Financial enterprises are excluded from this study due to their significant leverage, which is typical for companies in the financial sector but may signal financial problems in non-financial firms. Firms with missing values in the accounting information were excluded from the analysis. After excluding missing data and SMEs in the financial sector, the final sample consists of 496 observations from 124 companies between January 1, 2019 and December 31, 2022.

3.2. Variable Definitions

Both Trade Credit (Tradecredit) and Bank Loan (Bankloan) are considered to be dependent variables in this particular study. The first dependent variable, Tradecredit, is defined as the ratio of current trade payables and non-current trade

payables to total liabilities (Yang, 2011; Pinto et al., 2023). The second dependent variable, Bankloan, is defined as the ratio of current and non-current loans from banks to total liabilities (McGuinness & Hogan, 2014; Pinto et al., 2023). This model incorporates return on assets (ROA), derived by dividing total profit by total assets, as one of the independent variables that indicates the company's ability to generate profitability. Current ratio (Current) is used to indicate a firm's liquidity in this paper. Current ratio is defined as the ratio of total current assets to total current liabilities, which evaluates the company's ability to pay its short-term obligations. When considering collateral for bank loans, Property, plant, and equipment (PPE) and inventory are the common types of collateral used by banks for SME loans (Zhang et al., 2017; Attrams & Tshehla, 2022). In light of this, the collateral (Collateral) is included as one of the independent variables for bank loans, which is calculated by dividing the sum of PPE and inventory by total assets. Furthermore, this paper includes Inventory turnover ratio (Inventory) as an independent variable, which measures how efficiently a company is managing its inventory (Fang et al., 2022). This ratio is calculated by dividing the cost of goods sold and the rendering of services by the average inventory for a specific period. The higher ratio means the company can quickly move inventories, indicating the efficacy of the company's inventory management. This model incorporates three additional independent variables, including cash, the firm's age, and the firm's size. The cash variable (Cash) is determined by dividing total cash by total assets. The company's age (Age) is defined by the number of years since its establishment. The company's size (Size) is calculated by the natural logarithm of the company's total assets. Time dummies are integrated into this model as well, allowing for the analysis of how these trends may change over different periods, providing a more comprehensive understanding of SMEs' credit behavior.

3.3. Equations

Fixed effects and random effects regression models are commonly used in panel data analysis to account for individual-specific characteristics that may influence the outcome variables. The fixed effects model, also known as the within estimator, includes dummy variables for each individual or entity in the panel data to capture unobserved individual-specific effects that are constant over time. The random effects model assumes that individual-specific effects are uncorrelated with the regressors. It allows for unobserved heterogeneity across entities. Fixed effects and random effects regression are applied to panel data in this study. After that, the Hausman test is used to determine whether individual characteristics are correlated with the regressors. If they are correlated, fixed effects may be more appropriate; if not, random effects are considered. The model in this study is represented as follow:

$$\begin{aligned}\text{Bankloan}_i t = {} & \beta_{0i} + \beta_1 \text{Tradecredit}_{it} + \beta_2 \text{ROA}_{it} + \beta_3 \text{Current}_{it} \\ & + \beta_4 \text{Inventory}_{it} + \beta_5 \text{Cash}_{it} + \beta_6 \text{Size}_{it} + \beta_7 \text{Age}_{it} + \varepsilon_{it}\end{aligned}$$

$$\text{Tradecredit}_i t = \beta_{0i} + \beta_1 \text{Bankloan}_{it} + \beta_2 \text{ROA}_{it} + \beta_3 \text{Current}_{it} + \beta_4 \text{Collateral}_{it} + \beta_5 \text{Cash}_{it} + \beta_6 \text{Size}_{it} + \beta_7 \text{Age}_{it} + \varepsilon_{it}$$

where the dependent variables are trade credit and bank loan of firm i at time t, β_{0i} is the non-observed individual-specific effect, and ε_{it} the error term. In the random effects model, β_{0i} is considered a random variable, $\beta_{0i} = \beta_0 + u_i$, in the model represented as follow:

$$\text{Bankloan}_i t = \beta_0 + \beta_1 \text{Tradecredit}_{it} + \beta_2 \text{ROA}_{it} + \beta_3 \text{Current}_{it} + \beta_4 \text{Inventory}_{it} + \beta_5 \text{Cash}_{it} + \beta_6 \text{Size}_{it} + \beta_7 \text{Age}_{it} + u_i + \varepsilon_{it}$$

$$\text{Tradecredit}_i t = \beta_0 + \beta_1 \text{Bankloan}_{it} + \beta_2 \text{ROA}_{it} + \beta_3 \text{Current}_{it} + \beta_4 \text{Collateral}_{it} + \beta_5 \text{Cash}_{it} + \beta_6 \text{Size}_{it} + \beta_7 \text{Age}_{it} + u_i + \varepsilon_{it}$$

where u_i is the individual-specific error component, representing the random individual effect.

4. Results

Small and medium-sized businesses in several sectors, excluding technology, real estate, and construction, decreased their use of trade credit in 2020, the peak year of the pandemic's economic impact according to the IMF (Brown et al., 2021). This trend is illustrated in **Figure 1**. This could be due to the uncertainty and financial strain caused by the pandemic, leading businesses to be more cautious with their credit usage. In line with the study from Carbo-Valverde et al. (2013), the financial crisis led to a significant credit crunch, particularly affecting SMEs, which impacted their access to bank loans and trade credit. Additionally, during economic downturns like the pandemic recession, a decrease in consumer spending can lead to reduced demand, making it harder for firms to obtain trade financing. Instead of declining, the trade receivables of SMEs in the technology and construction sectors increase. This may be attributed to the rise in technology adoption to increase efficiency and adaptability to remote work, leading to an increase in demand for technology services and products. Moreover, the property and construction sector chart in **Figure 1** is inconsistent with the study by Anenberg & Ringothe (2021), which found that the COVID-19 pandemic has led to a significant tightening of the housing market, which can be attributed to a combination of increased demand and reduced supply. There is a noticeable and substantial rise in the resource industry in 2021. This is likely to drive up demand for resources used in manufacturing, construction, and other industries during pandemic recovery time, leading to an increase in trade credit in the resource industry.

On the other hand, the amount of bank loan borrowed from 2019 to 2022 varies by sector. The sectors that experienced a decline in the utilization of bank loans compared to the period prior to the outbreak of the pandemic are the Agro and Food, Consumer Products, Resource, and Technology industries, as illustrated in **Figure 2**. In line with OECD (2009), research indicates that during financial crises, SMEs face higher rejection rates for term loans compared to pre-crisis periods, making it more difficult for them to secure financing. The rejection

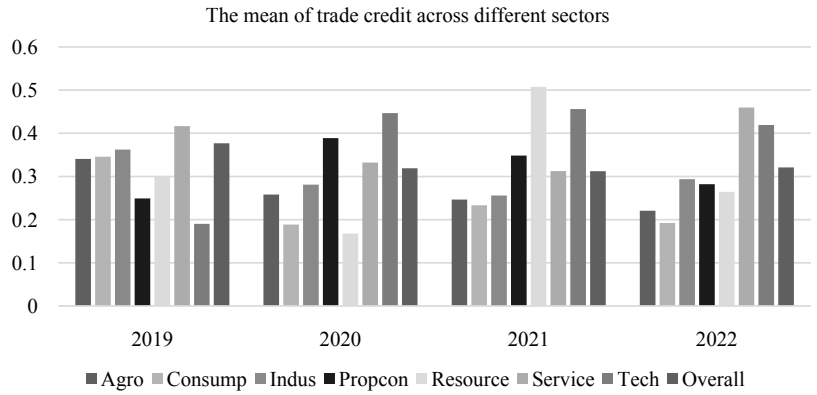

Figure 1. The use of trade credit across different sectors from 2019 to 2022. Source: The stock exchange of Thailand (SET).

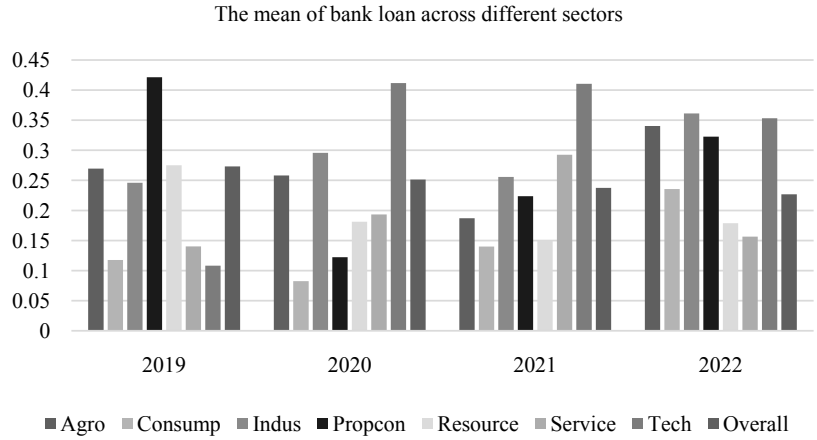

Figure 2. The use of bank loan across different sectors from 2019 to 2022. Source: The stock exchange of Thailand (SET).

rates for loans have been observed to increase significantly during economic downturns, affecting SMEs' ability to access credit (OECD, 2009). Following the pandemic, the majority of them continue to decline in 2021, except for the consumer product sector. In contrast, when the pandemic struck, the industries, services, and technology sectors borrowed more from banks, particularly in the technology sector. Compared to the pre-pandemic period, it indicates a shift in borrowing behavior. Despite the fact that some sectors reduced their bank loans during 2020, most sectors have borrowed more from banks since 2021, with the exception of the technology and consumer product sectors. This trend suggests that certain sectors are adapting and responding differently to the economic challenges brought about by the pandemic, potentially impacting their financing choice in long term.

4.1. Descriptive Analysis

A summary of the descriptive statistics available for all the variables is given in Table 1.

Table 1. Descriptive statistics.

Year	Obs	Variable	Trade Credit	Bank Loan	ROA	Current Ratio	Inventory turnover	Collateral	Cash	Size	Age
2019	124	Mean	0.38	0.27	4.79	2.47	57.70	0.41	0.08	20.65	23.69
		SD	0.26	0.28	12.58	2.56	364.37	0.25	0.13	0.74	10.47
2020	124	Mean	0.32	0.25	3.16	2.39	27.26	0.39	0.10	20.70	24.69
		SD	0.22	0.26	8.91	2.26	124.03	0.24	0.12	0.71	10.47
2021	124	Mean	0.31	0.24	5.99	2.43	32.03	0.38	0.09	20.78	25.69
		SD	0.22	0.26	14.35	2.37	141.10	0.23	0.11	0.68	10.47
2022	124	Mean	0.32	0.23	3.69	3.17	38.03	0.37	0.09	20.88	26.77
		SD	0.22	0.26	9.38	6.60	241.52	0.24	0.11	0.67	10.44
Overall	496	Mean	0.33	0.25	4.41	2.61	38.76	0.39	0.09	20.75	25.21
		SD	0.23	0.26	11.54	3.90	237.46	0.24	0.12	0.71	10.49

Source: Data from the stock exchange of Thailand (SET).

4.2. Variance Inflation Factor and Hausman Test

The Hauseman specification test is then implemented. The Hausman test is a significant tool in econometrics for detecting endogenous regressors in regression models. The test compares estimators to decide between fixed effects and random effects models, which is particularly useful for panel data analysis. After the hausman test, the *p*-value for these two models is equal to 0 which is less than 0.05, with the Chi-square test value of 41.16. Hence, the null hypothesis is rejected. This indicates that the fixed effects model is preferred over the random effects model for analysing trade credit. To detect multicollinearity, Variance inflation factor (VIF) has applied to all independent variables included in trade credit model; Cash (1.22), Bank loan (1.17), Current ratio (1.13), Size (1.10), Inventory turnover (1.05), ROA (1.04), and Age (1.03). The mean of VIF value is 1.10. It can be concluded that there is absence of collinearity among variables in the trade credit model. Following the Hausman test for the bank loan model, it is evident, with a *p*-value of 0.018, that the fixed effects model is more appropriate than the random effects model. To detect multicollinearity, Variance inflation factor (VIF) has applied to all independent variables included in bank loan model; Trade credit (1.31), Cash (1.24), Size (1.15), Current ratio (1.11), ROA (1.11), Collateral (1.10), and Age (1.07). The mean of VIF value is 1.16. It can be concluded that there is absence of collinearity among variables in the bank loan model.

4.3. Fixed Effects of Trade Credit Model

The fixed effects models of trade credit are shown in Table 2. The negative and significant coefficient of −0.316 in the bank loan model suggests that trade credit and bank loans serve as substitutes for SMEs during a recession caused by a pandemic. Research findings suggest that companies typically choose to utilize

Table 2. Fixed effects of trade credit model.

Trade credit	Coef.	St.Err.	*p*-value	Sig
Bank loan	−0.316	0.048	0.000	***
ROA	0.003	0.001	0.000	***
Current	−0.001	0.002	0.553	
Inventory turnover	0.000	0.000	0.649	
Cash	0.028	0.083	0.737	
Size	0.002	0.028	0.947	
Age	−0.019	0.005	0.000	***
Constant	0.837	0.553	0.131	
Mean dependent var				0.332
SD dependent var				0.230
Number of obs				496
R-squared				0.197
F-test				12.788
Prob > F				0.000

Source: The data from the stock exchange of Thailand (SET). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

either trade credit or bank loans, but not both simultaneously. SMEs that reduce their reliance on trade credit are likely to increase their need for bank loans, and vice versa. There appears to be a trade-off between trade credit and bank loans for SMEs when it comes to managing their financial requirements.

As a result, hypothesis 1 is validated, indicating a substitutive correlation between the use of trade credit and bank loans in SMEs during the pandemic recession. The findings are consistent with the study by Pinto et al. (2023), which looked at the sources of funding for SMEs in Portugal. Yang et al. (2020) also provide evidence that there is a substitution effect between trade credit and bank loans in small and micro enterprises in China.

The second variable that affects the use of trade credit is return on asset (ROA), which is a profitability-related variable. The coefficient of return on assets of 0.003 is positive and statistically significant. This means that if the return on assets of a SME increases, the likelihood of utilizing trade credit also increases. The outcome is consistent with the finding of Al-Eitan et al. (2023), who found a positive relationship between profitability and trade credit in SMEs and is one of the factors that contribute to the decision of SMEs to utilize trade credit. It supports the hypothesis that SMEs with higher profitability utilize more trade credit in Hypothesis 2a (H_{2a}). The current ratio, a liquidity-related variable, is used to test hypothesis 3a (H_{3a}). The results indicate that liquidity has a negative correlation of −0.001 with trade credit utilization and is unstatistically significant. This suggests that SMEs with higher liquidity may not necessarily rely on trade credit as a source of financing in financial distress. The observed relationship between liquidity and trade credit utilization is not strong enough to

confidently validate Hypothesis 3a (H_{3a}). Therefore, there is no significant relationship between liquidity and the utilization of trade credit in SMEs.

A coefficient of 0 for inventory turnover implies a lack of correlation between inventory turnover and trade payables. Hypothesis 5 cannot be conclusively validated. Contrary to the findings of Chen et al. (2023), which suggest that higher inventory and inventory turnover are positively associated with trade credit, efficient management of inventory can lead to increased trade credit utilization. Aside from inventory, cash and size exhibit a positive correlation with trade credit, although this relationship is not statistically significant. In contrast with the studies by Zubair et al. (2020), which mentioned that low cash balances encourage SMEs to increase their trade payables. This discrepancy could be due to differences in sample size, industry focus, or methodology. Further research is needed to explore the potential factors influencing the relationship between inventory management and trade credit utilization in SMEs. Additionally, Andrieu & Stagliano (2014) can explain the relationship between firm size and trade credit by pointing out that young and small businesses have more difficulty obtaining trade credit and that this relationship is positive.

The coefficient of −0.019 for firm age indicates a negative and statistically significant relationship. It can be implied that the younger the firm, the more trade credit it utilizes. The findings are consistent with a study by McGuinness and Hogan (2014), who found that younger companies rely more on trade credit due to limited access to bank financing and greater financial constraints. This suggests that as firms mature, they may have better access to alternative sources of financing, reducing their reliance on trade credit.

4.4. Fixed Effects of Bank Loan Model

Table 3 reveals that the trade credit variable in the bank loan model has a statistically significant negative association, as indicated by the coefficient of −0.339. This indicates that as firms secure more bank financing, they are less likely to rely on trade credit. The results are consistent with Carbó-Valverde et al. (2016), who identified a substitution between bank loans and trade credit that is conditional on the level of financing constraints and is more intense during the crisis. Consequently, both the trade credit model and the bank loan model support the first hypothesis. For the profitability variable, return on asset (ROA), the coefficient is 0 and not significant enough to reject the null hypothesis. This suggests that there is no clear relationship between profitability and the use of bank loans in this sample data set. Additionally, the lack of significance in the relationship between profitability and bank loan usage highlights the complexity of factors influencing financing decisions in firms. The coefficient for liquidity, as determined by the current ratio, is negative and not statistically significant. This indicates that there is no significant impact of liquidity on the use of bank loans in the sample studied. This finding implies that firms are not necessarily rely on their current assets to secure bank loans.

Table 3. Fixed effects of bank loan credit model.

Bank loan	Coef.	St.Err.	*p*-value	Sig
Trade credit	−0.339	0.051	0.000	***
ROA	0.000	0.001	0.633	
Current	−0.002	0.002	0.245	
Collateral	0.253	0.086	0.003	***
Cash	−0.190	0.084	0.025	**
Size	0.007	0.029	0.81	
Age	−0.015	0.005	0.002	***
Constant	0.519	0.576	0.369	
Mean dependent var				0.247
SD dependent var				0.264
Number of obs				496
R-squared				0.185
F-test				11.817
Prob > F				0.000

Source: Data from the stock exchange of Thailand (SET). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Within the framework of the bank loan model, the coefficient of collateral is found to be positive and statistically significant, with a value of 0.253. This suggests that collateral plays a more influential role in securing bank loans for SMEs compared to profitability and liquidity. It highlights the importance of having tangible assets to offer as security when seeking financial support from banks. The findings are consistent with a study by Ipek Erdogan (2020), who discovered that enterprises that pledge real estate collateral see a greater increase in bank lending, particularly for credit-constrained firms. Thus, Hypothesis 4 (H_4) is empirically validated. This indicates that having collateral can be a key factor in accessing financing for SMEs. It underscores the importance of considering tangible assets when applying for bank loans, as they can significantly impact the likelihood of approval.

Addressing the cash variable, the results demonstrated that its coefficient is −0.190 and significant at the 95% confidence level. This suggests that as cash holdings increase, firms' reliance on bank loans tends to decrease. The findings suggest that firms with stronger cash positions are more likely to manage their financial needs internally through cash reserves, leading to a reduced need for bank loans. The findings support Blattner et al.'s research, which shows that businesses with higher levels of cash have lessened external funding for bank loans. On the other hand, firm size is not statistically significant in both the trade credit and bank loan models. This implies that regardless of the size of the SMEs in Thailand, the use of trade credit and bank loans remains consistent.

This lack of statistical significance indicates that variations in firm size do not lead to significant changes in the utilization of trade credit or bank loans in SMEs. The results contradict the study from Chodorow-Reich et al. (2020), which provides evidence that firm size does affect the use of bank loans. The coefficient for firm age is −0.015 and has a statistically significant impact. These findings indicate that older SMEs had a lower tendency to depend on trade credit and bank loans in comparison to younger SMEs. The presence of a negative coefficient suggests that as companies mature, they may have accumulated sufficient money or developed strong connections with suppliers and lenders, hence decreasing their need for external funding (Ogubazghi & Muturi, 2014).

4.5. Robustness Test

Since this study included financial data from SMEs in various industries, it is important to conduct industry-specific tests to ensure the reliability of the results. This will help to validate the conclusions drawn from the data analysis. In doing so, the robustness tests by sector are conducted to ensure that the results are consistent and not overly dependent on specific sectors. For the trade credit model, the robustness tests revealed that the model's predictive power was strongest for companies in the manufacturing sector. The results reveal that the coefficients and significant level are consistent with the analysis results from this study in the Agro & Food Industry (AGRO), Consumer Products (CONSUMP), Industrial (INDUS), Services (SERVICE) and Property & Construction (PROPCON). Thus, the model is highly dependable for forecasting results in these industries. Additionally, the trade credit model's performance was found to be less reliable for companies in the resource (RESOURCE) and technology (TECH) sectors. This suggests that caution should be exercised when using the trade credit model to predict outcomes in these two particular industries. It could be due to the unique economic, regulatory, and market dynamics present in these sectors. Resource industries like oil or gas can be cyclical and sensitive to global commodity prices, which might affect their financing and credit use in ways not applicable to other sectors. In addition, technology industries also included startups, which have high growth potential but also high risk profiles and can lead to different financing patterns, such as a greater reliance on venture capital over trade credit. Similarly, according to the comparison among 7 industries for bank loan models, the resource industry also has non consistent results in the robustness test. This illustrates the unique challenges and variability in financing options across different sectors, highlighting the importance of understanding resource and technology industry-specific factors when analysing trade credit and bank loan use and financing patterns. The further study could explore how external factors, such as commodity prices or government regulations, impact financing decisions within the resource and technology industry. This deeper analysis could provide valuable insights for businesses operating in this sector to make more informed financial decisions.

5. Conclusion

As a result of the uncertainty and financial strain caused by the pandemic, small and medium-sized businesses across the majority of industries decreased their utilization of trade credit in the peak year of the pandemic's economic impact in the year 2020. This motivated businesses to be more cautious with their utilization of credit. Moreover, the utilization of bank loans differs between sectors; yet, for most sectors, there is a declining trend in the use of bank loans. Despite the fact that a number of industries reduced their borrowing from banks in 2020, the majority of industries have increased their borrowing from banks since 2021. This pattern suggests that various sectors are adjusting and reacting in a variety of ways to the economic limitations brought about by the pandemic, which may have an effect on the strategies that they choose to implement for their long-term financing strategy.

When considering a trade credit model, the fixed effect is appropriate for analysis. SMEs utilized trade credit and bank loans as substitutions during the period from 2019 to 2022. If SMEs decrease the use of trade credit, they increase the use of bank loans, and vice versa. This implies a trade-off between financial needs. Therefore, Hypothesis 1 (H_1) is supported. Additionally, return on asset (ROA), a profitability-related indicator, influences the utilization of trade credit in SMEs as well. A positive and statistically significant coefficient suggests that a greater ROA enhances the likelihood of using trade credit. Thus, Hypothesis 2a (H_{2a}) is also supported. Nevertheless, the outcome of the current ratio variable, a liquidity-related variable, is insufficient to strongly reject the null hypothesis, consequently, Hypothesis 3a (H_{3a}) is rejected. In addition, this study found no correlation between inventory turnover and the usage of trade credit, contradicting previous findings. As a result, Hypothesis 5 (H_5) is rejected. The discrepancy may be attributed to differences in sample size and industry focus. Future research could explore the impact of industry-specific factors on the relationship between trade credit and bank loan usage.

In regard to the bank loan model, the coefficient of the trade credit variable indicates a statistically significant inverse correlation. SMEs ought to lower their reliance on trade credit as they obtain more bank financing. Consequently, both the bank loan model and the trade credit model validate Hypothesis 1 (H_1). Hypothesis 2b (H_{2b}) does not provide sufficient evidence to reject the null hypothesis, as the coefficient for return on assets is not statistically significant. This analysis suggests that there is no apparent association between the profitability of a company and its use of bank loans. Additionally, the current ratio's measurement of the coefficient for the liquidity variable is statistically insignificant and negative. This suggests that liquidity had no substantial impact on the use of bank loans in the sample analyzed. Thus, Hypothesis 3b (H_{3b}) is rejected, demonstrating that the findings do not support the idea that liquidity levels influence the decision to use bank loans.

Moreover, this paper revealed that collateral significantly influences bank loan utilization in SMEs. Thus, Hypothesis 4 (H_4) is empirically validated, suggesting that having collateral can be a key factor in accessing financing for SMEs. Besides, the cash variable suggests that as cash holdings increase, firms' reliance on bank loans tends to decrease. The findings show that firms with stronger cash positions are more likely to manage their financial needs internally through cash reserves, leading to a reduced need for bank loans. Regardless of the size of the SMEs, the use of trade credit and bank loans is consistent. Finally, this paper reveals that older SMEs are less likely to rely on trade credit and bank loans compared to younger SMEs. Understanding the dynamics between these two funding sources, trade credit and bank loan, and other factors that influence the uses of two sources of financing can help SMEs effectively navigate financial challenges and make informed decisions to ensure long-term success. By leveraging both trade credit and bank loans strategically, SMEs can optimize their financial resources and position themselves for growth in the future.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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