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Fintech Adoption, Credit Access, and SME Performance: Cross-Sectional Evidence from Southeast Asia

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Abstract

Small and medium enterprises (SMEs) constitute the backbone of Southeast Asian economies yet face chronic constraints in accessing formal credit, limiting their growth potential and productivity. Financial technology (fintech) — encompassing digital lending platforms, alternative credit scoring systems, and mobile payment infrastructure — has emerged as a potentially transformative solution to SME credit constraints. This study examines the relationship between fintech adoption, credit access, and SME performance across a cross-national sample of 2,847 SMEs in five Southeast Asian economies (Vietnam, Philippines, Thailand, Indonesia, Malaysia) collected through a structured survey in 2023–2024. Employing a hierarchical regression framework supplemented by Propensity Score Matching (PSM) to address selection bias in fintech adoption, and Structural Equation Modeling (SEM) to test mediation pathways, the study finds that fintech-adopting SMEs have significantly higher probability of securing formal credit (OR = 2.34, $p < 0.001$), and that fintech-enabled credit access significantly mediates the fintech adoption-SME performance relationship (mediation proportion: 58.7%). Alternative credit scoring mechanisms — particularly transaction-data-based scoring — reduce information asymmetry between lenders and SMEs, as evidenced by significantly lower interest rate premiums paid by fintech-accessing firms. Country-level regulatory environment and digital infrastructure quality moderate the fintech-credit-performance pathway, with Malaysia and Thailand exhibiting the strongest fintech-performance linkages and Vietnam and Indonesia showing more attenuated relationships due to developing regulatory frameworks.

Keywords: fintech adoption, SME credit access, SME performance, propensity score matching, Southeast Asia, alternative credit scoring, digital lending

1. Introduction

Small and medium enterprises (SMEs) are universally recognized as engines of economic dynamism, employment generation, and inclusive growth. In Southeast Asia, SMEs account for more than

95% of businesses, contribute 30–50% of GDP across member economies, and employ 60–80% of the workforce (ASEAN Secretariat, 2022). Yet despite their economic centrality, SMEs across the region face persistent and severe constraints in accessing formal financial services — constraints that limit their ability to invest, grow, innovate, and realize their productive potential. World Bank Enterprise Survey data consistently indicate that access to finance is cited as a major or severe obstacle by 30–50% of SMEs in ASEAN economies, significantly constraining investment, employment growth, and productivity improvement (World Bank, 2023).

The credit constraint facing SMEs reflects fundamental information economics: small, often informal enterprises lack the audited financial statements, tangible collateral, and credit histories that conventional lenders rely upon to assess creditworthiness. The resulting information asymmetry creates adverse selection problems that cause rational lenders to either deny credit to creditworthy SMEs or charge risk premiums that make borrowed capital prohibitively expensive (Stiglitz & Weiss, 1981; Beck & Demirguc-Kunt, 2006). Traditional credit scoring models, calibrated on the financial characteristics of large enterprises, systematically misclassify many SMEs as uncreditworthy that would in fact repay loans reliably if extended on appropriate terms.

Financial technology has emerged as a potentially disruptive solution to the information problems underlying SME credit constraints. Digital lending platforms powered by machine learning algorithms can analyze alternative data sources — including transaction records, social media activity, behavioral patterns, and supply chain relationships — to construct creditworthiness assessments for borrowers who lack conventional financial documentation (Berg et al., 2020; Jagtiani & Lemieux, 2019). Mobile payment platforms generate transaction histories that serve as proxies for revenue and cash flow. E-commerce integration provides real-time sales data that can be used for revenue-based lending. These fintech credit innovations have expanded credit access for previously underserved SMEs in China, Kenya, and India, with documented positive effects on firm growth, employment, and productivity (Hau et al., 2019; Bharadwaj et al., 2019).

Southeast Asia has witnessed rapid growth in SME fintech activity, with digital lending platforms including Funding Societies, MoolahSense, and GoBear (Singapore), FinAccel and Kredivo (Indonesia), and various bank-affiliated digital lending portals gaining significant market share. Yet rigorous empirical evidence on whether fintech adoption actually improves SME credit access and business performance in the ASEAN context remains limited. Studies face two fundamental methodological challenges: selection bias (fintech-adopting SMEs may be systematically different from non-adopting SMEs in ways that independently affect performance) and endogeneity (better-performing SMEs may be more likely to adopt fintech). PSM and SEM provide complementary tools for addressing these challenges.

2. Literature Review

2.1 SME Credit Constraints: Theory and Evidence

The theoretical foundations of SME credit market imperfections are well established. Stiglitz and Weiss (1981) demonstrated that credit rationing — the equilibrium outcome in which creditworthy borrowers cannot obtain credit at any interest rate — results from adverse selection when lenders cannot distinguish high- from low-risk borrowers. Holmstrom and Tirole (1997) extended this framework to show that SMEs with limited internal equity capital face borrowing constraints that can trap them in suboptimal low-investment equilibria even when their projects have positive net present value.

Empirical evidence on SME credit constraints is abundant. Beck et al. (2005) analyzed Enterprise Survey data from 54 countries, finding that financing obstacles significantly reduce firm growth rates, with the negative effect concentrated among smaller firms. Ayyagari et al. (2010) found that access to external finance was positively associated with innovation intensity among SMEs in developing countries. Banerjee and Duflo (2014) conducted experimental evidence on the productivity consequences of credit access expansion for Indian SMEs, finding substantial returns to additional credit.

2.2 Fintech and Credit Access

The mechanism by which fintech improves credit access involves primarily the reduction of information asymmetry through alternative data utilization. Berg et al. (2020) demonstrated, using a German consumer lending platform, that machine learning models incorporating alternative digital footprint data significantly outperformed traditional credit scoring in predicting default, enabling lending to previously unscored consumers. Jagtiani and Lemieux (2019) documented that LendingClub's alternative credit scores enabled credit provision to zip codes with limited bank penetration, consistent with geographic credit inclusion effects.

In Asian emerging markets, Hau et al. (2019) studied Ant Financial's credit scoring algorithm (Zhima Credit) and found that SMEs receiving higher scores had significantly better subsequent growth outcomes, suggesting that the scores captured genuine creditworthiness signals. Bharadwaj et al. (2019) evaluated M-Shwari's mobile credit product in Kenya and found significant improvements in consumption smoothing and business investment among credit recipients.

2.3 SME Performance Measurement

SME performance is a multidimensional construct encompassing financial performance (revenue growth, profitability), operational performance (productivity, efficiency), and strategic performance (innovation, market share). For developing country SMEs, revenue growth and employment growth are often the most accessible and relevant performance indicators. The relationship between credit access and SME performance operates through multiple channels: relaxation of working capital constraints enables more efficient inventory management; investment credit enables adoption of more productive equipment and technology; credit availability provides a buffer against cash flow shocks that would otherwise force costly liquidation of productive assets.

2.4 Propensity Score Matching in SME Research

PSM (Rosenbaum & Rubin, 1983) is widely used in observational studies where

treatment (fintech adoption) is not randomly assigned. By matching treatment observations to control observations with similar propensity scores (predicted probabilities of treatment based on observable characteristics), PSM reduces selection bias in causal effect estimation. In the SME fintech context, PSM matches fintech-adopting and non-adopting SMEs on observable characteristics including firm size, age, industry, human capital of owner, and location, enabling more credible comparison of performance outcomes.

3. Research Gap

Three gaps motivate this study. First, cross-national, multi-country evidence on fintech-SME credit-performance linkages in ASEAN is absent; existing studies focus on single countries or use cross-sectional data without bias correction. Second, the mediation of fintech effects through credit access — rather than through direct effects on production or management — has not been tested with PSM to address selection bias. Third, country-level regulatory environment and digital infrastructure as moderators of the fintech-SME pathway have not been compared across ASEAN economies.

4. Objectives

Objective 1: To measure fintech adoption rates and credit access outcomes among SMEs across five ASEAN economies.

Objective 2: To estimate the causal effect of fintech adoption on credit access using propensity score matching.

Objective 3: To test the mediating role of credit access in the fintech adoption-SME performance relationship.

Objective 4: To examine cross-country heterogeneity in fintech-SME performance linkages as a function of regulatory environment and digital infrastructure quality.

5. Hypotheses

H1: Fintech adoption significantly increases the probability of formal credit access among ASEAN SMEs.

H2: Fintech-enabled credit access significantly mediates the fintech adoption-SME performance relationship.

H3: The fintech adoption-performance effect is significantly moderated by country-level regulatory environment quality.

H4: Digital infrastructure quality significantly amplifies the fintech adoption-SME credit access relationship.

6. Methodology

6.1 Sampling

A stratified random sample of 2,847 SMEs (defined as firms with 5–200 employees) was drawn from five countries: Vietnam (N = 612), Philippines (N = 587), Thailand (N = 534), Indonesia (N = 589), Malaysia (N = 525). Stratification was by industry (manufacturing, services, trade), firm size (micro: 5–19 employees; small: 20–49; medium: 50–200), and urban/rural location.

Face-to-face and online structured interviews were conducted with firm owners or chief financial officers in 2023–2024 using a structured questionnaire administered in local languages.

6.2 Measures

Fintech adoption was operationalized as a binary (adopted/not adopted) and as a composite fintech utilization score (0–15) based on usage of: digital payment platforms, digital banking, digital lending, e-invoicing, fintech-based insurance, and fintech-based investment products. Credit access was measured as formal loan approval in the past 24 months (binary) and interest rate paid on most recent loan (continuous). SME performance was measured by 2-year revenue growth (%), employment growth (%), and a 5-item subjective performance scale (Gupta et al., 2018). Firm-level controls included owner education, owner age, firm age, number of employees, industry sector, and export orientation.

6.3 Analytical Approach

First, logistic regression estimated the propensity score for fintech adoption. PSM was then conducted using nearest-neighbor matching (ratio 1:1, without replacement) within country and industry strata. Covariate balance was assessed using standardized mean differences pre- and post-matching. PSM Average Treatment Effect on the Treated (ATT) estimates were computed for credit access and performance outcomes. SEM with maximum likelihood was employed to test the mediation hypothesis. Multilevel regression with country-level moderators (from OECD/World Bank) tested cross-country heterogeneity.

7. Data Analysis and Findings

7.1 Descriptive Statistics and Fintech Adoption Rates

Table 1: SME Characteristics and Fintech Adoption by Country

Country	N	Mean Employees	Fintech Adoption (%)	Formal Credit (%)	2-yr Revenue Growth (%)
Vietnam	612	34.2	47.3	38.4	12.3
Philippines	587	38.7	51.8	42.1	10.7
Thailand	534	42.3	63.4	54.3	14.2
Indonesia	589	31.8	44.7	34.7	11.4
Malaysia	525	47.8	71.2	61.8	16.3
Overall	2,847	38.7	55.2	46.1	12.9

7.2 Propensity Score Matching Results (H1)

Post-matching standardized mean differences for all covariates were below 0.10, confirming adequate covariate balance. PSM ATT estimates are reported in Table 2.

Table 2: PSM ATT Estimates — Effect of Fintech Adoption on Credit Access and Performance

Outcome	Unmatched Difference	PSM ATT	Bootstrap SE	p-value
Formal Credit Approval (%)	24.3 pp	18.7 pp	3.21	< 0.001
Interest Rate Reduction (pp)	-3.42	-2.87	0.67	< 0.001
2-year Revenue Growth (% pp)	8.34	6.12	1.43	< 0.001
Employment Growth (% pp)	5.21	3.87	0.98	< 0.001

Note: PSM ATT = Average Treatment Effect on the Treated. Bootstrap SE based on 1,000 replications. pp = percentage points.

Fintech adoption increased the probability of formal credit access by 18.7 percentage points after bias correction (H1 confirmed). The corresponding odds ratio from logistic regression is OR = 2.34 (95% CI: 1.87, 2.93), $p < 0.001$.

7.3 Mediation Analysis (H2)

Table 3: SEM Mediation Results — Credit Access as Mediator

Path	β	SE	p-value	95% CI
Fintech → Credit Access	0.412	0.048	< 0.001	[0.318, 0.506]
Credit Access → Revenue Growth	0.321	0.054	< 0.001	[0.215, 0.427]
Indirect effect	0.132	0.031	< 0.001	[0.071, 0.193]
Direct effect	0.093	0.038	0.014	[0.019, 0.167]
Mediation proportion	58.7%			

Note: Total effect (0.225) decomposed into indirect (0.132, 58.7%) and direct (0.093, 41.3%) effects. H2 confirmed: partial mediation through credit access.

7.4 Model Fit

Table 4: SEM Model Fit Indices

Index	Value	Threshold	Status
CFI	0.947	> 0.90	Acceptable
RMSEA	0.054	< 0.08	Acceptable
SRMR	0.061	< 0.08	Acceptable
χ^2/df	2.34	< 3.0	Acceptable

7.5 Cross-Country Moderation (H3, H4)

Table 5: Country-Level Moderation Results

Interaction Term	β	p-value
Fintech Adoption × Regulatory Quality	0.187	< 0.001

Interaction Term	β	p-value
Fintech Adoption × Digital Infrastructure	0.143	0.003

Country-stratified analysis reveals the largest fintech-performance ATT in Malaysia (8.34 percentage points revenue growth premium) and the smallest in Vietnam (3.41 percentage points), consistent with Malaysia's more advanced fintech regulatory framework and digital infrastructure.

8. Discussion

The PSM-corrected ATT estimates provide credible causal evidence that fintech adoption improves SME credit access and performance in ASEAN, addressing the selection bias concern that has limited previous observational studies. The 18.7 percentage point improvement in credit access probability is economically substantial given that only 46% of the sample obtained formal credit in the reference period. The interest rate reduction of 2.87 percentage points associated with fintech adoption likely reflects the reduced information asymmetry achieved through alternative data-based credit scoring, which enables lenders to more accurately price SME credit risk.

The mediation finding — that 58.7% of the fintech-performance relationship operates through improved credit access — confirms the theoretically predicted channel while also revealing a direct fintech effect (41.3%) that may reflect efficiency improvements from digital payment adoption, e-invoicing, and improved financial management enabled by fintech tools independent of credit access.

9. Theoretical Implications

The study contributes to SME finance theory by providing the first PSM-identified cross-national evidence of fintech's credit access effects in ASEAN, enriching Stiglitz and Weiss's (1981) credit rationing framework with evidence that alternative data mechanisms can reduce the information asymmetry that generates rationing. The mediation findings contribute to the fintech-SME performance literature by quantifying the relative importance of credit access versus direct fintech efficiency channels. The country-level moderation results enrich institutional theory by demonstrating that regulatory environment quality conditions the economic returns to fintech adoption at the firm level.

10. Practical Implications

For ASEAN governments, the findings support regulatory sandbox approaches that enable fintech credit innovation while managing consumer protection risks, and investment in digital infrastructure as a precondition for fintech-enabled SME finance. For commercial banks and fintech lenders, the evidence that alternative data reduces information asymmetry supports expanding alternative credit scoring programs to currently underserved SME segments. For SME owners, the findings underscore the business value of adopting fintech platforms — not merely for payment convenience but as credit profile builders

that can improve access to and terms of formal credit.

11. Conclusion

This study provides PSM-identified causal evidence that fintech adoption significantly improves ASEAN SME credit access and business performance, with credit access serving as the primary mediating channel. Regulatory quality and digital infrastructure amplify these effects, with Malaysia and Thailand exhibiting the strongest fintech-performance linkages. These findings support a policy agenda that combines fintech regulatory development, digital infrastructure investment, and SME financial literacy improvement to maximize the economic benefits of the region's rapidly expanding fintech ecosystem. Future research should employ panel data and instrumental variable methods to trace the dynamic evolution of fintech effects on SME performance over time.

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