INNOVATION AND DISCOURAGED BORROWING AMONG SMES: EVIDENCE FROM ASIAN ECONOMIES

The 13th International Conference on Emerging Challenges: Business Dynamics in Disruptive Economy

Nguyen Minh Hai[1*], Hoang Hai Yen[2] and Vu Thi Le Giang[2]

[1] PhD Candidate, School of Banking, College of Business, UEH University, Ho Chi Minh City, Vietnam

[2] School of Banking, College of Business, UEH University, Ho Chi Minh City, Vietnam

[*] Corresponding author: nmhai252@gmail.com

Abstract

Research purpose:

This study examines how innovation influences borrowing behavior among small and medium-sized enterprises (SMEs) in 19 Asian countries, focusing on discouraged borrowing - when firms avoid applying for credit due to fear of rejection.

Research motivation:

Discouraged borrowing is a hidden form of financial exclusion that constrains SME growth. While widely studied in Europe and advanced economies, evidence for Asia remains limited despite distinct financial infrastructures and institutions. This study tests whether innovation reduces discouragement and whether firm size moderates this relationship

Research design, approach, and method:

Using pooled cross-sectional World Bank Enterprise Surveys (2013 - 2024) covering 12,000+ SMEs across 19 Asian economies, we estimate logistic regressions with extensive controls and country - industry - year fixed effects, include interaction terms for firm-size heterogeneity, and run robustness checks by income group and separately for product and process innovation.

Main findings:

Innovation intensity significantly reduces discouraged borrowing, supporting its role as a positive signal of competitiveness and growth potential. The effect varies across firm sizes - strongest for large firms - yet benefits are evident for SMEs overall. Robustness checks confirm consistency across upper- and lower-middle-income economies and show that both product and process innovation independently lower discouragement.

Practical implications:

Policies should strengthen innovation as a credible financing signal. Governments can expand innovation funds and credit guarantees to support smaller firms, while lenders tailor products for innovative SMEs. Because both product and process innovation reduce discouragement, support should span a broad range of innovation activities, alongside stronger credit information systems - especially in lower-middle-income countries - to promote financial inclusion.

Keywords: Discouraged borrowing, innovation, SMEs, access to finance, Asian economies, financial inclusion.

1. INTRODUCTION

Access to bank credit remains a persistent challenge for SMEs, particularly in emerging economies (Romero Alvarez et al., 2025). Although bank loans are the most widely studied source of external finance, SMEs often face limited access due to structural barriers and inefficiencies in financial systems (Lee et al., 2015). These constraints are especially problematic for innovative firms, which are more likely to encounter absolute credit rationing (Lee et al., 2015) or discouraged borrowing, where firms refrain from applying for loans due to anticipated rejection, high perceived risks, or negative experiences with the funding process (Brown et al., 2022; Kon & Storey, 2003).

Innovation is widely recognized as a driver of competitiveness and resilience in SMEs (Garrido-Moreno et al., 2024). Among different types, process innovation is often prioritized over product innovation in resource-constrained settings (Chang-Muñoz et al., 2022). Yet, in many developing economies, underdeveloped financial markets, high collateral requirements, and weak institutional support restrict SMEs' ability to finance innovative activities (Aliano et al., 2024;

Fu & Jian, 2021). Consequently, SMEs in such contexts frequently rely on internal funds, leading to fewer innovations and limited growth potential (Machokoto & Omotilewa, 2024).

The relationship between innovation and finance is inherently complex. On the one hand, investment in research and development (R&D) and innovation can signal growth potential, enhance transparency, and improve creditworthiness in the eyes of lenders (Mol-Gómez-Vázquez et al., 2018; Gama et al., 2017; Brown et al., 2022; Cheng & Yang, 2022). On the other hand, the uncertain and risky nature of innovation may intensify financing constraints and borrower discouragement (de Moraes Silva et al., 2022). Mina et al. (2013) further highlight that while lenders respond positively to tangible innovation outputs such as product and process innovations, they remain cautious toward high-risk, opaque activities with long pay-off periods. This underscores that innovation does not uniformly enhance financing prospects; rather, its signaling value depends on the type of innovation and the degree of informational transparency it provides to financial institutions. Prior studies suggest that well-designed financial policies and stronger banking systems can mitigate such discouragement by reducing information asymmetries and strengthening SMEs' access to credit (Lorenz & Pommet, 2017; Gama et al., 2017).

Despite these insights, limited empirical attention has been devoted to the link between innovation and borrower discouragement in Asian economies, where SMEs dominate the business landscape and institutional settings differ substantially from those in Europe or advanced economies. Addressing this gap, this study aims to investigate the role of innovation in shaping borrowing behavior among SMEs in Asian countries, with a particular focus on discouraged borrowing. Specifically, the paper examines (i) whether innovation reduces borrower discouragement, and (ii) how firm size moderates the effect of innovation on borrower discouragement.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature and develops the hypotheses. Section 3 describes the methodology and data. Section 4 presents the empirical results and discussion. Section 5 concludes with implications for research and policy.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Innovation and SMEs

Innovation is widely recognized as a key driver of competitiveness and resilience for SMEs, particularly in emerging economies where financial and institutional constraints are more pronounced. Product innovation refers to the introduction of new or significantly improved goods or services, while process innovation involves upgrading production methods and delivery mechanisms (Wellalage et al., 2019; Sabando-Vera et al., 2025). In developing countries, such innovations tend to be incremental or adaptive rather than radical, reflecting firms' limited access to formal R&D infrastructures and resources (Wellalage et al., 2019). Despite these constraints, innovation remains a crucial pathway for SMEs to improve productivity, expand market reach, and enhance environmental performance.

Empirical research further emphasizes that while innovation is generally beneficial for SMEs, its outcomes are shaped by contextual conditions. Rosenbusch et al. (2011) argue that the success of innovation in SMEs depends on factors such as firm age, the type of innovation activities pursued, and the broader cultural environment. Similarly, Bayarçelik et al. (2014) highlight that management skills, technological capability, financial strength, and firm size are among the most critical determinants of innovation success. These findings suggest that SMEs' ability to benefit from innovation is not uniform but contingent on their internal resources and external environment.

However, innovation activities are resource-intensive and risky, requiring upfront investment and long-term funding. Access to finance is therefore a decisive factor shaping SMEs' ability to innovate. Firms with stronger financial foundations are better positioned to invest in technological upgrades, staff training, and cleaner production processes, while financially constrained SMEs tend to underinvest in innovation (Klewitz & Hansen, 2014). This financing - innovation nexus highlights the need to explore not only how access to credit fosters innovation but also whether innovation itself influences SMEs' financing behavior.

2.2. Discouraged borrowers in the SME sector

SMEs often face financial barriers arising from both the supply and demand side of credit markets. From the supply side, credit rationing theory (Stiglitz & Weiss, 1981) stresses the role of asymmetric information, while from the demand side, discouraged borrower theory (Kon & Storey, 2003) explains why firms with financing needs refrain from applying for loans due to fear of rejection. Empirical evidence underscores the severity of this demand-side failure (Freel et al., 2012; Gama et al., 2017; Levenson & Willard, 2000). Their findings indicate that discouraged borrowers outnumber rejected applicants by a factor of two to three. Such discouragement undermines SMEs' growth and restricts their economic contributions.

Empirical studies confirm that borrower discouragement is shaped by a combination of entrepreneur characteristics, firm attributes, and institutional environments. For instance, female-led businesses face higher discouragement due to biases and limited financial access (Bertrand & Perrin, 2022; Ghosh, 2023), while inexperienced managers are more likely to self-exclude due to weak banking relationships (Freel et al., 2012). Firm size is another determinant: micro and younger firms are significantly more discouraged than larger and established ones (Chakravarty & Xiang, 2013;

Owen et al., 2023). Contextual conditions also matter - corruption and weak institutions exacerbate discouragement in developing countries (Mac an Bhaird et al., 2016; Statnik et al., 2023). These patterns suggest that discouraged borrowing is multidimensional and may interact with firms' innovation activities in important ways.

2.3. The relationship between innovation and discouraged borrowing in SMEs

The literature presents mixed evidence on how innovation shapes discouraged borrowing. A number of studies suggest that innovation reduces discouragement by signaling growth potential and managerial capability. Mol-Gómez-Vázquez et al. (2018) find that product and process innovation enhance managerial attitudes, strengthen firms' ability to handle loan application procedures, and improve performance, thereby lowering discouragement. Similarly, Gama et al. (2017) provide robust evidence that innovative SMEs are significantly less likely to self-exclude from credit markets, while descriptive statistics indicate that discouraged borrowers are systematically less innovative than loan applicants. Empirical studies also suggest that innovative SMEs are more likely to be perceived as creditworthy and proactive in seeking finance. However, smaller and younger companies, often including innovative SMEs, face significant challenges in securing external finance (Czarnitzki & Hottenrott, 2011; Lee et al., 2015).

By contrast, Brown et al. (2022) show that innovative SMEs, especially product innovators, may be more prone to discouragement. Their study indicates that product innovation is positively associated with discouragement, with a stronger effect than process innovation. This challenges the conventional view of innovation as a financing facilitator and suggests that innovation may exacerbate informational opacity, risk perceptions, and uncertainty, thereby deterring SMEs from seeking credit.

These contrasting perspectives indicate that the innovation - discouragement relationship is context-dependent, shaped by the type of innovation, institutional settings, and firm-specific characteristics. Yet, most existing evidence comes from Spain, Eastern Europe and Central Asia, or the United Kingdom (Mol-Gómez-Vázquez et al., 2018; Gama et al., 2017; Brown et al., 2022). Little is known about how this relationship plays out in Asian countries, where SMEs dominate the economy but face weaker financial infrastructures, higher information asymmetries, and less effective legal systems. This gap calls for deeper investigation into how innovation influences discouraged borrowing in the Asian SME context.

2.4. Hypotheses development

Prior evidence shows that innovative SMEs are more proactive in seeking credit to finance growth opportunities (Lee et al., 2015). Innovation not only signals competitiveness and growth potential but also enhances transparency in the eyes of lenders. Accordingly, it is expected to lower the probability of discouraged borrowing among SMEs.

Hypothesis 1. Innovation intensity reduces the likelihood of becoming a discouraged borrower among SMEs in Asian countries.

Firm size also plays a critical moderating role in SMEs' financing behavior. Larger firms typically encounter fewer financing obstacles than small and medium-sized firms because they benefit from lower transaction costs, reduced risk premiums, and greater collateral availability, which make them less opaque to lenders (Beck & Demirgüç-Kunt, 2006). These advantages can strengthen the credibility of their innovative activities and reduce the likelihood of borrower discouragement. In contrast, smaller firms often face limited collateral, weaker financial transparency, and underdeveloped credit histories, which restrict their ability to leverage innovation as a positive signal in credit markets (Berger & Udell, 1998; Freel, 2007).

Hypothesis 2. The effect of innovation intensity on borrower discouragement varies across firm sizes.

3. METHODOLOGY

3.1. Data

This study employs firm-level data from the World Bank Enterprise Surveys (WBES) conducted between 2013 and 2024 to investigate the relationship between innovation activities and discouraged borrowing among SMEs in Asia. The WBES dataset is well-suited for this research as it provides standardized, cross-country data on firms' innovation behavior (e.g., product and process innovation), access to finance, and borrowing intentions, alongside key firm characteristics.

The initial dataset covers 20 Asian countries, with firm-level information available from two to three survey waves of the WBES conducted between 2013 and 2024. Following the World Bank income classification, the sample includes both upper-middle-income economies - Armenia, Azerbaijan, Indonesia, Kazakhstan, Malaysia, and Mongolia - and lower-middle-income economies - Bangladesh, Bhutan, Cambodia, India, Kyrgyz Republic, Lao PDR, Myanmar, Nepal, Philippines, Tajikistan, Timor-Leste, Uzbekistan, Vietnam, and West Bank and Gaza. Although the WBES surveys were conducted in two to three waves for each country between 2013 and 2024, the firms are not tracked longitudinally. Therefore, the dataset represents a pooled cross-sectional structure rather than a panel.

However, Cambodia was excluded from the final analytical sample due to severe data limitations that compromise statistical reliability. In the 2023 WBES survey, out of 88 firms, only two were recorded as non-discouraged borrowers, while 86 were identified as discouraged borrowers, resulting in an extremely imbalanced distribution that prevents meaningful estimation. Moreover, the 2013 wave lacks several key control variables, including the gender of the top manager and years of managerial experience. These shortcomings make Cambodia unsuitable for inclusion in the pooled regressions or longitudinal comparisons.

As a result, the final dataset includes 19 countries, ensuring greater comparability across years and consistency in variable measurement. These selected economies present a diverse but relevant sample of Asian SMEs operating under varying levels of economic development and financial system maturity. The use of multiple WBES waves enhances the robustness of the findings and allows for a broader understanding of how innovation influences discouraged borrowing behavior across different institutional and market contexts.

3.2. Empirical strategy and variable define

The dataset is structured as pooled cross-sectional observations rather than a balanced panel, as firms are not tracked across survey waves.

To test Hypothesis 1, the study estimates the impact of green economy practices on discouraged borrowing using the following baseline model:

$$Discouraged_{i,k} = \alpha + \beta_1 InnovationIndex + \beta_2 Entrepreneur_Charact._{i,k} + \beta_3 SME_Firm_Charact._{i,k} + \beta_4 Perception_{i,k} + FE\ (country,\ industry,\ year) + \varepsilon_{i,k} \quad (1)$$

In the above model, borrower discouragement ($Discouraged_{i,k}$) is identified based on firms' responses to the question: "What was the main reason why this establishment did not apply for a loan?" Firms reporting "no need for a loan" are not classified as discouraged, while those citing complex procedures, high interest rates, high collateral requirements, or expected rejection are categorized as discouraged borrowers ($Discouraged_{i,k}$ =1). This variable takes a value of zero if a firm applies for credit. This measure has been widely applied in prior studies (Bertrand et al., 2022; Chakravarty & Xiang, 2013).

The main independent variable, InnovationIndex, captures the overall innovation capacity of SMEs. This index is constructed using principal component analysis from two key binary variables provided by the WBES:

NewProduct: A binary variable equal to 1 if the establishment introduced new or significantly improved products or services during the survey period, and 0 otherwise.

NewProcess: A binary variable equal to 1 if the establishment implemented new or significantly improved processes in production or service delivery, and 0 otherwise.

Both variables reflect core aspects of product and process innovation, respectively. The InnovationIndex takes into account the correlation between these two dimensions to create a composite indicator that better represents a firm's overall innovation activity. Higher values of the index indicate a greater intensity of innovation engagement, while lower values reflect minimal or no innovation efforts.

This approach enables a more nuanced and continuous measurement of innovation behavior compared to treating product and process innovation separately or using binary indicators alone.

Control variables are classified into three categories: entrepreneur characteristics, firm characteristics, and firm perceptions.

Entrepreneur characteristics: Gender is a dummy equal to 1 when the top manager is female and 0 otherwise. Experience measures the number of years of professional experience of the top manager.

Firm characteristics: SmeSize is defined by employment level, with small firms (5 - 19 employees) and medium firms (20 - 99 employees). Overdraft equals 1 if the firm has access to an overdraft facility, while CreditLine equals 1 if the firm holds a line of credit or loan from a financial institution. ExterAudit indicates whether annual financial statements are checked and certified by an external auditor. Certificate takes the value of 1 if the firm possesses an internationally recognized quality certification. DiExport measures the share of sales derived from direct exports, and FFirm equals 1 when foreign ownership exceeds 10%.

Firm's perception of its operating environment: Access is a dummy variable coded 1 if access to finance is reported as a major or severe obstacle. Corrupt equals 1 if corruption is regarded as a major or severe obstacle.

To test Hypothesis 2, the model is extended by interacting InnovationIndex with FirmSize (small, medium, large):

$$Discouraged_{i,k} = \alpha + \beta_1 InnovationIndex + \beta_2 FirmSize + \beta_3\ InnovationIndex \times FirmSize + \beta_4 Entrepreneur_Charact._{i,k} + \beta_5 Firm_Charact._{i,k} + \beta_6 Perception_{i,k} + FE\ (country,\ industry,\ year) + \varepsilon_{i,k} \quad (2)$$

This specification examines whether the relationship between innovation and discouraged borrowing varies by firm size while accounting for key firm-level attributes and country, industry, and year fixed effects.

4. RESULTS AND DISCUSSION

4.1. Descriptive statistics

Table 1 presents the descriptive statistics for the variables used in the analysis. Approximately 66% of SMEs are classified as discouraged borrowers, indicating a widespread hesitation to seek formal financing, possibly due to fear of rejection or perceived unfavorable loan conditions.

The average InnovationIndex is relatively low at 0.07, with a wide range from -0.73 to 2.73, suggesting that most SMEs engage minimally in product or process innovation. This highlights a potential innovation gap in the region, which may be tied to resource constraints or limited institutional support.

In terms of firm characteristics, only 15.2% of businesses are women-led, and the average managerial experience is 15.6 years, indicating moderately experienced firm leadership. The average SmeSize score of 1.45 suggests most firms fall within the small to medium enterprise categories.

Access to finance remains limited. Only 33.1% of firms have an overdraft facility, and 38.5% hold a credit line or loan. Nearly 50% undergo external audits, while just 17.3% possess an international quality certification, underlining gaps in financial accountability and operational standards.

Firms report low international engagement, with direct exports accounting for only 4.5% of sales on average. Moreover, foreign ownership is rare, with only 2.8% of firms having any foreign capital participation.

Institutional challenges are evident: 23.9% of SMEs cite limited access to finance as a major constraint, and 25.8% report corruption as a significant obstacle to business operations. These contextual factors are important in interpreting SMEs' borrowing behavior and innovation decisions.

Overall, the descriptive statistics suggest that SMEs in these Asian economies face substantial barriers in both innovation adoption and access to finance, setting a strong foundation for examining how innovation influences discouraged borrowing.

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Discouraged	12851	.66	.474	0	1
InnovationIndex	12851	.07	1.259	-.734	2.729
Gender	12851	.152	.359	0	1
Experience	12851	15.567	9.848	1	72
SmeSize	12851	1.446	.497	1	2
Overdraft	12851	.331	.471	0	1
CreditLine	12851	.385	.487	0	1
ExterAudit	12851	.499	.5	0	1
Certificate	12851	.173	.378	0	1
DiExport	12851	4.453	17.586	0	100
FFirm	12851	.028	.166	0	1
Access	12851	.239	.426	0	1
Corrupt	12851	.258	.438	0	1

4.2. Logistic regression analysis

Table 2 presents the logistic regression results examining how innovation intensity and firm characteristics influence borrower discouragement among SMEs in Asian countries. Model (1), which incorporates country, industry, and year fixed effects, is statistically significant and exhibits a good model fit (Pseudo $R^2 = 0.225$).

The results strongly support Hypothesis 1, showing that innovation intensity significantly reduces the likelihood of being a discouraged borrower. The coefficient on the InnovationIndex is negative and highly significant ($\beta = -0.086$, $p < 0.01$), indicating that more innovative SMEs are less prone to self-exclude from credit markets. This finding aligns with signaling theory, suggesting that innovation conveys firms' competitiveness, adaptability, and growth potential to external stakeholders, thereby lowering the perceived risks of applying for credit.

Beyond innovation, several firm- and entrepreneur-level characteristics significantly shape borrowing behavior. Managerial experience reduces discouragement ($\beta = -0.014$, $p < 0.01$), implying that experienced managers are better positioned to navigate financial systems and overcome perceived credit barriers. Larger firms are also less discouraged ($\beta = -0.181$, $p < 0.01$), consistent with the view that scale, reputation, and transparency enhance firms' credit access.

Financial factors exert strong influences on discouraged borrowing. SMEs with access to overdraft facilities ($\beta = -0.273$, $p < 0.01$) or credit lines ($\beta = -1.913$, $p < 0.01$) are substantially less likely to be discouraged, underscoring the importance of established financial relationships in mitigating perceived risks. This result is in line with Osei-Tutu and Weill (2023) and Statnik et al. (2023), who also show that prior access to overdrafts and credit lines significantly lowers the likelihood of discouraged borrowing among SMEs. Similarly, firms with an external audit ($\beta = -0.277$, $p < 0.01$) or holding a quality certification ($\beta = -0.185$, $p < 0.01$) face lower discouragement, reflecting how credibility signals can improve confidence in the loan application process. Alduraywish (2023) and Statnik et al. (2023) provides evidence that SMEs with audited statements tend to have greater formal credit access, supporting our result. Export activity also contributes to reducing discouragement ($\beta = -0.005$, $p < 0.01$), as more internationally engaged firms may be perceived as more competitive and creditworthy. This aligns with Pietrovito and Pozzolo (2021), who show that exporting SMEs face fewer credit constraints, and with Statnik et al. (2023), who find that firms engaged in direct export activities are systematically less likely to be discouraged from applying for credit. Together, this evidence suggests that export participation strengthens firms' external credibility and reduces their likelihood of self-exclusion from credit markets.

By contrast, some contextual and institutional factors increase discouragement. Firms that perceive access to finance as a major obstacle are more likely to self-exclude ($\beta = 0.147$, $p < 0.01$), highlighting how subjective barriers translate into discouraged borrowing. Corruption presents a more complex picture. While the regression results indicate that firms operating in environments where corruption is a severe obstacle report lower discouragement ($\beta = -0.134$, $p < 0.05$), this contrasts with prior evidence showing its detrimental effects. Amin and Motta (2021) find that higher levels of corruption significantly increase the likelihood of SMEs being financially constrained, while Statnik et al. (2023) show that corruption particularly discourages female entrepreneurs from seeking credit. The divergence may reflect context-specific adaptation strategies, where some firms rely on informal networks or alternative financing mechanisms to bypass corrupt practices, thereby appearing less discouraged in the data.

Taken together, the results confirm the central role of innovation in reducing discouraged borrowing (Hypothesis 1) and highlight the importance of managerial capacity, firm size, financial relationships, and credibility signals in shaping SMEs' credit market participation. The moderating effect of firm size on the innovation - discouragement nexus will be further examined in extended models to test Hypothesis 2.

Table 2. Logistic regression model of Discouragement: the role of Innovation

	Model (1) Discouraged	Model (2) Discouraged
InnovationIndex	-0.086***	-0.059**
	(0.020)	(0.026)
SmeSize	-0.181***	
	(0.047)	
FirmSize = 2 (medium)		-0.166***
		(0.047)
FirmSize = 3 (large)		-0.142**
		(0.058)
FirmSize = 2 × InnovationIndex		-0.030
		(0.035)
FirmSize = 3 × InnovationIndex		-0.145***
		(0.039)

	Model (1) Discouraged	Model (2) Discouraged
Gender	0.070	0.070
	(0.061)	(0.055)
Experience	-0.014***	-0.015***
	(0.002)	(0.002)
Overdraft	-0.273***	-0.267***
	(0.058)	(0.051)
CreditLine	-1.913***	-1.896***
	(0.047)	(0.041)
ExterAudit	-0.277***	-0.368***
	(0.055)	(0.048)
Certificate	-0.185***	-0.222***
	(0.064)	(0.051)
DiExport	-0.005***	-0.004***
	(0.001)	(0.001)
FFirm	-0.129	0.010
	(0.124)	(0.094)
Access	0.147***	0.190***
	(0.054)	(0.049)
Corrupt	-0.134**	-0.157***
	(0.056)	(0.048)
_cons	1.818***	1.525***
	(0.368)	(0.349)
Observations	12847	16645
Pseudo R^2	0.225	0.243

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. FirmSize = 1 (small firms) is the reference category. Interaction terms are relative to this baseline.

To assess whether the effect of innovation intensity on borrower discouragement varies across firm sizes, Model (2) introduces interaction terms between InnovationIndex and FirmSize (classified into small, medium, and large firms, with small firms as the reference group). The model is statistically significant (Pseudo $R^2 = 0.243$) and includes SMEs across all size categories.

The results provide support for Hypothesis 2. The interaction term for large firms is negative and significant ($\beta = -0.145$, $p < 0.01$), indicating that innovation reduces discouraged borrowing more strongly in large firms compared to small ones. By contrast, the interaction for medium-sized firms is not significant, suggesting that the discouragement-reducing effect of innovation for medium firms does not differ substantially from that of small firms. These findings imply that firm size moderates the magnitude but not the direction of the innovation–discouragement relationship. Innovation consistently reduces discouraged borrowing across all size groups, reaffirming its central role in shaping SMEs' borrowing behavior.

Examining firm size independently, both medium-sized ($\beta = -0.166$, $p < 0.01$) and large firms ($\beta = -0.142$, $p < 0.05$) are less likely to be discouraged borrowers relative to small firms. This reinforces the notion that financial stability, accumulated reputation, and established relationships with lenders allow larger firms to face fewer barriers when considering credit applications.

The average marginal effects (Figure 1) confirm that innovation lowers the predicted probability of discouraged borrowing for small, medium, and large firms; the reduction is largest for large firms, whereas small and medium firms also experience statistically meaningful declines (with overlapping confidence intervals between the latter two). Overall, innovation consistently reduces discouraged borrowing across firm-size categories; firm size amplifies the effect - largest for large firms - while the benefits for small and medium enterprises remain evident and policy-relevant.

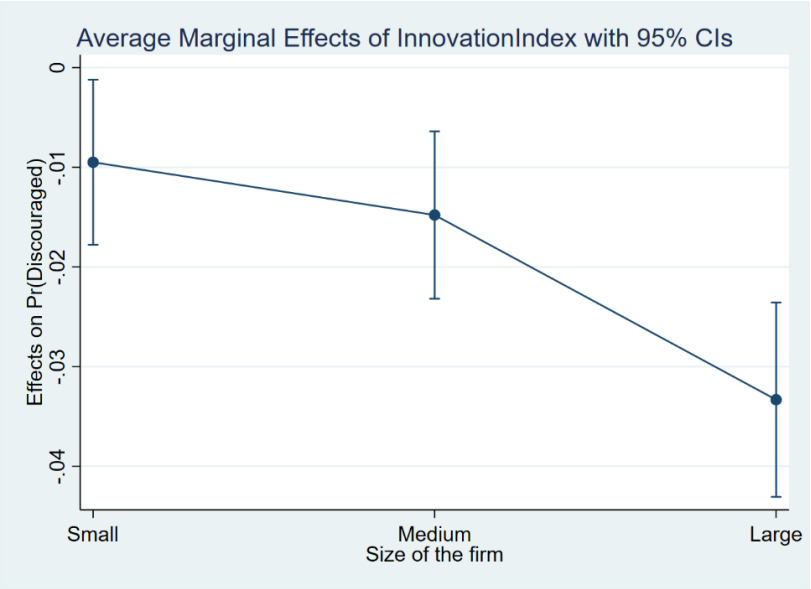


Figure 1. Average marginal effects of innovation on discouraged borrowing by firm size

4.3. Robustness check

To verify the robustness of the baseline findings, the analysis further disaggregates the role of innovation across different contexts. First, separate estimations were conducted for upper-middle- and lower-middle-income countries. The results confirm that the negative effect of innovation intensity on borrower discouragement is consistent across both groups. The effect is highly significant in upper-middle-income countries, indicating that innovation plays a particularly strong role in reducing discouragement where financial and institutional systems are more developed. In lower-middle-income countries, the association also holds but is statistically weaker, reflecting the persistent barriers that limit the ability of SMEs to translate innovation into financing advantages.

Second, the robustness check distinguishes between product and process innovation to assess whether the results are driven by a specific type of innovation. The estimations show that both innovation forms significantly reduce discouraged borrowing. Firms that introduce new products as well as those that adopt new production processes are less likely to self-exclude from credit markets, underscoring the broad importance of innovation in shaping borrowing behavior.

Taken together, the robustness analyses provide strong evidence that the discouragement-reducing role of innovation is consistent across income groups as well as across different innovation types. This consistency enhances the validity of the empirical results and highlights the wider relevance of innovation as a mechanism that helps SMEs overcome financing constraints in diverse institutional settings.

Table 3. Robustness check

	(1) Discouraged (Upper middle income countries)	(2) Discouraged (Lower middle income countries)	(3) Discouraged	(4) Discouraged
			(All 19 countries)	
InnovationIndex	-0.186***	-0.042*		
	(0.041)	(0.023)		
NewProduct			-0.225***	
			(0.054)	
NewProcess				-0.189***
				(0.059)
Control vars	YES	YES	YES	YES
Country, industry, year FE	YES	YES	YES	YES
Observations	3696	9151	12871	12855
Pseudo R^2	0.248	0.223	0.224	0.224

5. CONCLUSION

This study investigates the role of innovation in shaping borrowing behavior among SMEs in 19 Asian countries, with a particular focus on discouraged borrowing. Using pooled cross-sectional data from multiple waves of the WBES (2013 - 2024) and logistic regression models with extensive controls and fixed effects, the findings provide consistent evidence that innovation intensity significantly reduces the likelihood of being a discouraged borrower. This supports the view that innovation serves as a positive signal of competitiveness and growth potential, encouraging SMEs to engage with formal credit markets.

The analysis also highlights the moderating role of firm size. While innovation benefits all SMEs, the discouragement-reducing effect is most pronounced among large firms, reflecting their stronger reputational capital, collateral availability, and established financial relationships. Small and medium firms also gain from innovation, but structural barriers such as limited transparency and weaker credit histories restrict their ability to fully leverage innovation in financing decisions. Robustness checks across income groups further confirm the validity of these findings, showing that the innovation - discouragement relationship holds in both upper- and lower-middle-income economies, though with varying magnitudes. In addition, separate estimations for product and process innovation reveal that both forms independently and significantly reduce discouraged borrowing, reinforcing the general importance of innovation activities regardless of their specific type.

The paper makes four key contributions. First, it extends the discouraged borrower literature by incorporating innovation as a determinant of borrowing behavior, an area previously underexplored in the Asian context. Second, it demonstrates the heterogeneous effect of innovation across firm sizes, providing new insights into how structural characteristics interact with signaling mechanisms in SME finance. Third, it shows that both product and process innovations play significant roles in mitigating borrower discouragement, highlighting that the results are not driven by a single innovation dimension. Fourth, it offers comparative evidence across institutional contexts, highlighting that financial infrastructure and country-specific conditions shape the extent to which innovation reduces discouragement.

From a policy perspective, the results underscore the need for targeted measures that strengthen the role of innovation as a credible signal in credit markets. Financial institutions could design lending products tailored to innovative SMEs, while governments may expand innovation funds, credit guarantees, and capacity-building programs to help smaller firms translate their innovation efforts into improved access to finance. Given that both product and process innovation reduce discouraged borrowing, policymakers should support a broad spectrum of innovation activities rather than focusing narrowly on technological breakthroughs. Strengthening credit information systems and reducing informational opacity are particularly important in lower-middle-income economies to ensure that innovation benefits are not restricted to larger or better-connected firms.

Despite these contributions, the study has some limitations. The WBES data for 2013 - 2024 are pooled cross-sections rather than panel data, which constrains causal inference. In addition, the InnovationIndex is constructed only from product and process innovation and does not capture other dimensions such as organizational change, digital adoption, or R&D activities. Future research could address these limitations by employing longitudinal data to strengthen causal claims, expanding the measurement of innovation to include broader dimensions, and conducting cross-regional or country-specific analyses to better capture institutional differences in shaping discouraged borrowing.

6. REFERENCES

Aghion, P., Bloom, N., Blundell, R., Griffith, R., & Howitt, P. (2005). Competition and innovation: An inverted-U relationship. *The Quarterly Journal of Economics, 120*(2), 701-728. https://doi.org/10.1093/qje/120.2.701

Alduraywish, Y. (2023). Do audited firms have better access to credit?: Evidence from emerging countries. *Cogent Business & Management*, *10*(2), 2195985. https://doi.org/10.1080/23311975.2023.2195985

Aliano, M., Cestari, G., & Madonna, S. (2024). Financial instruments for green finance tailored to SMEs. In M. Aliano, G. Cestari, & S. Madonna (Eds.), *Sustainable Finance for SMEs: The Role of Capital for Sustainable and Inclusive Growth* (pp. 73-91). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-74193-7_5

Amin, M., & Motta, V. (2023). The impact of corruption on SMEs' access to finance: Evidence using firm-level survey data from developing countries. *Journal of Financial Stability*, *68*, 101175. https://doi.org/10.1016/j.jfs.2023.101175

Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2011). Firm innovation in emerging markets: The role of finance, governance, and competition. *Journal of Financial and Quantitative Analysis*, *46*(6), 1545-1580. https://doi.org/10.1017/S0022109011000378

Bayarçelik, E. B., Taşel, F., & Apak, S. (2014). A Research on Determining Innovation Factors for SMEs. *Procedia - Social and Behavioral Sciences, 150*, 202-211. https://doi.org/10.1016/j.sbspro.2014.09.032

Beck, T., & Demirgüç-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking & Finance, 30*(11), 2931-2943. https://doi.org/10.1016/j.jbankfin.2006.05.009

Beck, T., Demirgüç-Kunt, A., & Maksimovic, V. (2008). Financing patterns around the world: Are small firms different?. *Journal of financial economics*, *89*(3), 467-487. https://doi.org/10.1016/j.jfineco.2007.10.005

Berger, A. N., & Udell, G. F. (1998). The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. *Journal of Banking & Finance, 22*(6-8), 613-673. https://doi.org/10.1016/S0378-4266(98)00038-7

Bertrand, J., & Perrin, C. (2022). Girls Just Wanna Have Funds? The effect of women-friendly legislation on female-led firms' access to credit. *International Review of Law and Economics, 72*, 106101. https://doi.org/10.1016/j.irle.2022.106101

Bertrand, J., Burietz, A., & Perrin, C. (2022). Just the two of us, we can't make it if we try: Owner-CEO gender and discouragement. *Economics Letters, 216*, 110596. https://doi.org/10.1016/j.econlet.2022.110596

Brown, R., Liñares-Zegarra, J. M., & Wilson, J. O. S. (2022). Innovation and borrower discouragement in SMEs. *Small Business Economics*, *59*(4), 1489-1517. https://doi.org/10.1007/s11187-021-00587-1

Carbo-Valverde, S., Rodriguez-Fernandez, F., & Udell, G. F. (2016). Trade credit, the financial crisis, and SME access to finance. *Journal of Money, Credit and Banking*, *48*(1), 113-143. https://doi.org/10.1111/jmcb.12292

Chakravarty, S., & Xiang, M. (2013). The international evidence on discouraged small businesses. *Journal of Empirical Finance, 20*, 63-82. https://doi.org/10.1016/j.jempfin.2012.09.001

Chang-Muñoz, E., Mercado-Caruso, N., Gazabon, D. O., Segarra-Oña, M., & Osorio, S. N. (2022). Product or process innovation? The dilemma for exporting SMEs in emerging economies: the case of the Colombian Caribbean. *Procedia Computer Science*, *198*, 620-625. https://doi.org/10.1016/j.procs.2021.12.296

Cheng, C., & Yang, L. (2022). What drives the credit constraints faced by Chinese small and micro enterprises? *Economic Modelling*, *113*, 105898. https://doi.org/10.1016/j.econmod.2022.105898

Czarnitzki, D., & Hottenrott, H. (2011). R&D investment and financing constraints of small and medium-sized firms. *Small Business Economics*, *36*(1), 65-83. https://doi.org/10.1007/s11187-009-9189-3

de Moraes Silva, D., S. Vonortas, N., & Antonelli, C. (2022). Elgar Encyclopedia on the Economics of Knowledge and Innovation. In *Chapter 1: Barriers to innovation* (pp. 12-21). Edward Elgar Publishing. https://doi.org/10.4337/9781839106996.00006

Freel, M. S. (2007). Are small innovators credit rationed? *Small Business Economics, 28*(1), 23-35. https://doi.org/10.1007/s11187-005-6058-6

Freel, M., Carter, S., Tagg, S., Mason, C., & Mason, C. (2012). The latent demand for bank debt: characterizing 'discouraged borrowers'. *Small Business Economics, 38*, 399-418. https://doi.org/10.1007/s11187-010-9283-6

Fu, T., & Jian, Z. (2021). Corruption pays off: How environmental regulations promote corporate innovation in a developing country. *Ecological Economics*, *183*, 106969. https://doi.org/ 10.1016/j.ecolecon.2021.106969

Gama, A. P. M., Duarte, F. D., & Esperança, J. P. (2017). Why discouraged borrowers exist? An empirical (re) examination from less developed countries. *Emerging Markets Review*, *33*, 19-41. https://doi.org/10.1016/j.ememar.2017.08.003

Garrido-Moreno, A., Martín-Rojas, R., & García-Morales, V. J. (2024). The key role of innovation and organizational resilience in improving business performance: A mixed-methods approach. *International Journal of Information Management*, *77*, 102777. https://doi.org/ 10.1016/j.ijinfomgt.2024.102777

Ghosh, S. (2023). Gender and discouraged borrowers: Evidence from India. *Journal of International Development, 35*(7), 1731-1752. https://doi.org/10.1002/jid.3748

Klewitz, J., & Hansen, E. G. (2014). Sustainability-oriented innovation of SMEs: a systematic review. *Journal of Cleaner Production*, *65*, 57-75. https://doi.org/10.1016/j.jclepro.2013.07.017

Kon, Y., & Storey, D. J. (2003). A theory of discouraged borrowers. *Small Business Economics, 21*, 37-49. https://doi.org/10.1023/A:1024447603600

Lee, N., Sameen, H., & Cowling, M. (2015). Access to finance for innovative SMEs since the financial crisis. *Research Policy*, *44*(2), 370-380. https://doi.org/10.1016/j.respol.2014.09.008

Levenson, A. R., & Willard, K. L. (2000). Do firms get the financing they want? Measuring credit rationing experienced by small businesses in the US. *Small business economics*, *14*, 83-94. https://doi.org/10.1023/A:1008196002780

Levine, R. (2005). Finance and growth: Theory and evidence. In P. Aghion & S. Durlauf (Eds.), *Handbook of Economic Growth* (Vol. 1, pp. 865-934). Elsevier. https://doi.org/10.1016/S1574-0684(05)01012-9

Lorenz, E., & Pommet, S. (2017). Innovation, credit constraints and national banking systems: A Comparison of developing nations. *Université Côte d'Azur*, 34.

Mac an Bhaird, C., Vidal, J. S., & Lucey, B. (2016). Discouraged borrowers: Evidence for Eurozone SMEs. *Journal of International Financial Markets, Institutions and Money, 44*, 46-55. https://doi.org/10.1016/j.intfin.2016.04.009

Machokoto, M., & Omotilewa, O. J. (2024). The impact of borrowing concentration on innovation: When is one not just enough? *Economics Letters*, *236*, 111613. https://doi.org/ 10.1016/j.econlet.2024.111613

Mina, A., Lahr, H., & Hughes, A. (2013). The demand and supply of external finance for innovative firms. *Industrial and Corporate Change, 22*(4), 869-901. https://doi.org/10.1093/icc/dtt020

Mol-Gómez-Vázquez, A., Hernández-Cánovas, G., & Ramon Llorens, M. C. (2018). Borrower discouragement in a bank-based economy: Empirical evidence for Spanish SMEs. *Universia Business Review*, *57*, 144-162. https://doi.org/10.3232/UBR.2018.V15.N1.04

Osei-Tutu, F., & Weill, L. (2023). Individualism reduces borrower discouragement. *Journal of Economic Behavior & Organization*, *211*, 370-385. https://doi.org/10.1016/j.jebo.2023.05.014

Owen, R., Botelho, T., Hussain, J., & Anwar, O. (2023). Solving the SME finance puzzle: an examination of demand and supply failure in the UK. *Venture Capital, 25*(1), 31-63. https://doi.org/10.1080/13691066.2022.2135468

Pietrovito, F., & Pozzolo, A. F. (2021). Credit constraints and exports of SMEs in emerging and developing countries. *Small Business Economics*, *56*, 311-332. https://doi.org/10.1007/s11187-019-00225-x

Romero Alvarez, Y. P., Salas-Navarro, K., Martínez, L. B., & Zamora-Musa, R. (2025). Financing innovation in SMEs: a systematic review of financing channels. *International Journal of Innovation Science*. https://doi.org/10.1108/ijis-06-2024-0151

Rosenbusch, N., Brinckmann, J., & Bausch, A. (2011). Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of Business Venturing, 26*(4), 441-457. https://doi.org/10.1016/j.jbusvent.2009.12.002

Sabando-Vera, D., Montalván-Burbano, N., Parrales-Guerrero, K., Yonfá-Medranda, M., & Plaza-Úbeda, J. A. (2025). Growing a greener future: A bibliometric analysis of green innovation in SMEs. *Technological Forecasting and Social Change*, *212*, 123976. https://doi.org/10.1016/j.techfore.2025.123976

Statnik, J.-C., Vu, T.-L.-G., & Weill, L. (2023). Does corruption discourage more female entrepreneurs from applying for credit? *Comparative Economic Studies, 65*(1), 1-28. https://doi.org/10.1057/s41294-022-00184-5

Wellalage, N. H., & Fernandez, V. (2019). Innovation and SME finance: Evidence from developing countries. *International Review of Financial Analysis*, *66*, 101370. https://doi.org/10.1016/j.irfa.2019.06.009