

Caught Between Loan Sharks and Non-Price Credit Constraints: A Credit Rationing Theory Perspective on the Predicament of Microentrepreneurs in Albay, Philippines

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Abstract— Microenterprises represent a dominant share of micro, small, and medium enterprises (MSMEs) in the Philippines; yet, they remain critically underserved by the formal financial system. Consequently, many microentrepreneurs resort to loan sharks who impose exploitative interest rates and rigid repayment terms. In response to this growing problem, a government-initiated cooperative-based loan program offering lower interest rates was launched to curb reliance on informal lenders. This study evaluated the program’s impact on borrowing behavior using a quasi-experimental Difference-in-Differences (DiD) design with 188 microentrepreneurs in Albay Province. Results revealed a statistically significant general decline in loan shark borrowing frequency following program implementation ($\beta = -0.519, p < 0.05$); however, the program-specific treatment effect on beneficiaries was statistically insignificant ($\beta = 0.244, p > 0.05$). Persistent informal borrowing was attributed to non-price credit constraints including loan ceiling limitations, processing delays, and the transactional convenience of informal credit. The findings of this work therefore corroborated the credit rationing theory and demonstrated that while interest rate reductions improve formal credit uptake, structural barriers perpetuate dependence on informal lending. Policy recommendations derived out of the results of this work include increasing loan ceilings, streamlining approval procedures, designing flexible repayment schedules, and strengthening borrower-institution trust.

Keywords— *credit rationing, informal lending, loan sharks, microentrepreneurs, Difference-in-Differences*

I. INTRODUCTION

Microenterprises constitute more than 90.49% of all micro, small, and medium enterprises (MSMEs) in the Philippines (based on 2022 PSA data) and serve as fundamental drivers of employment and local economic development, particularly in rural areas [1], [2]. Despite their economic significance, these enterprises face persistent barriers to formal credit access, compelling many microentrepreneurs to rely on informal lending channels. Among the most prevalent informal sources are loan sharks—locally known as “5-6” lenders—who offer rapid, collateral-free financing but impose monthly interest rates

of up to 20%, fostering cycles of indebtedness and financial vulnerability [3], [4].

The persistence of informal borrowing despite the availability of formal credit options constitutes a central puzzle in development finance. Stiglitz and Weiss [5] provide a foundational theoretical framework through their credit rationing model which demonstrates that under conditions of asymmetric information, lenders may impose non-price constraints—such as collateral requirements, documentation demands, and eligibility criteria—rather than relying solely on interest rate adjustments. These constraints, while designed to mitigate adverse selection and moral hazard, can inadvertently exclude creditworthy borrowers from formal markets [2], [6].

In response to the entrenched problem of informal lending, the Philippine government initiated a cooperative-based credit program offering microentrepreneurs loans at a substantially reduced monthly interest rate of 2.5%. The program, delivered through cooperatives accredited by the Department of Trade and Industry (DTI), targets market vendors, sari-sari store owners, and small-scale operators, with loan amounts ranging from PhP 5,000 to PhP 200,000 (approximately USD 88–USD 3,524). Its primary objective is to provide a viable formal credit alternative that reduces dependence on loan sharks.

While substantial literature examines credit rationing in developing economies [6]–[8] and the impact of microfinance on informal credit markets [8], [9], there remains a notable gap in empirical evidence from the Philippine context regarding whether government-subsidized formal lending programs effectively displace informal borrowing. Layaoen and Takahashi [9] found that microfinance “crowds out” informal lending at the national level but their analysis does not examine program-specific treatment effects among targeted microentrepreneurs.

This study, in an attempt to address this identified gap, employed a Difference-in-Differences (DiD) quasi-experimental design to evaluate whether the government-initiated low-interest loan program produces a measurable reduction in loan shark borrowing among its beneficiaries in

Albay Province. The study contributes to the literature by providing causal evidence on the interaction between formal credit interventions and informal borrowing persistence, interpreted through the lens of credit rationing theory.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

A. Credit Rationing Theory

The seminal work of Stiglitz and Weiss [5] established that credit rationing can persist even in competitive equilibrium due to information asymmetries between lenders and borrowers. Banks cannot perfectly distinguish borrower risk profiles; consequently, raising interest rates may attract riskier applicants (adverse selection) or incentivize riskier behavior (moral hazard). To manage these risks, lenders impose non-price constraints—including collateral requirements, documentation standards, and loan ceilings—that restrict credit access independently of interest rates [6], [10].

Recent extensions of the theory emphasized the multidimensional nature of credit constraints. Jin and Zhang [2] demonstrated that microenterprises are disproportionately affected by credit rationing due to their limited asset bases and informational opacity. Xu et al. [11] showed that even digital financial innovations may not fully resolve non-price barriers, as borrower-lender informational gaps remain structurally embedded. These findings suggested that simply lowering interest rates through formal programs may be insufficient to redirect borrowing away from informal sources.

B. Informal Lending and Microenterprise Credit Behavior

Informal lending remains deeply entrenched in Southeast Asian credit markets, particularly among financially marginalized groups [3], [4]. In the Philippines, loan sharks offer distinct transactional advantages—immediacy of disbursement, absence of documentation requirements, and relationship-based trust—that formal institutions typically cannot match [3], [12]. Zapata [12] finds that microentrepreneurs with low daily sales and limited assets face the most severe formal credit constraints, regardless of prevailing interest rates.

At the national level, Layaoen and Takahashi [9] provided evidence from Philippine household data that microfinance access can crowd out informal lending from both moneylenders and personal networks. However, this crowding-out effect depends critically on program design: Chung et al. [13] showed that in Myanmar, community-driven microfinance significantly reduced informal borrowing, but only because the program was designed to substitute directly for informal credit sources. Programs that fail to address the non-price advantages of informal lending—speed, flexibility, and proximity—may not achieve similar displacement effects [8], [14].

C. Government Credit Interventions and Design Limitations

Government credit guarantee and subsidy programs have been widely implemented in developing countries with mixed results. Wang et al. [15] demonstrated that loan guarantees can alleviate credit rationing but only when carefully targeted at genuinely constrained borrowers. Poorly designed programs may instead benefit less-constrained borrowers, exacerbating inequality. In the Philippine context, Dumlao [16] noted that mandatory credit allocation policies often fall short because

sectoral allocations do not correspond to actual needs, and banks tend to prioritize established clients over new, underserved borrowers.

The existing literature thus suggests that lowering interest rates through government programs can make formal credit more attractive but is insufficient to shift borrowers away from loan sharks if structural barriers—documentation requirements, processing delays, loan ceiling inadequacy, and collateral demands—remain unaddressed [6], [12], [15]. This study therefore extends this literature by providing direct empirical evidence on the treatment effect of a specific government loan intervention on informal borrowing behavior.

III. METHODOLOGY

A. Research Design

This study employs a quasi-experimental Difference-in-Differences (DiD) design to estimate the causal effect of a government-initiated loan program on the frequency of borrowing from informal lenders (loan sharks) among microentrepreneurs. The DiD approach identifies policy impact by comparing changes in outcomes over time between treated and untreated groups, thereby controlling for time-invariant unobserved heterogeneity and common temporal trends [17], [18].

Prior to the conduct of the study, the research underwent institutional review and was determined to pose negligible risk to participants, as it involved non-invasive data collection focused on financial behaviors without exposure to sensitive or harmful procedures. In line with ethical research standards, strict measures were implemented to ensure participant confidentiality and anonymity; all identifying information was removed or anonymized during data processing and analysis, and results were reported in aggregate form. Furthermore, this study was formally commissioned by Bicol University through an administrative order issued to the author, providing institutional authorization for the conduct of the research. This institutional backing ensured that the study adhered to established research governance protocols while addressing policy-relevant questions aimed at informing local economic and financial inclusion strategies.

B. Sample and Data Collection

Data were collected through structured survey interviews with microentrepreneurs in Albay Province, Philippines. The treatment group comprised 109 respondents randomly selected from 150 borrowers who availed of the government-initiated low-interest loan program. The control group included 79 respondents randomly selected from 100 borrowers who obtained standard cooperative loans not subsidized by the government. Simple random sampling was employed within each group to minimize selection bias.

The survey instrument captured pre- and post-intervention data on the key outcome variable: the annual frequency of borrowing from loan sharks. Respondents also reported qualitative reasons for continued informal borrowing post-intervention.

C. Empirical Model

The DiD estimation is specified as follows:

$$Y_{it} = \beta_0 + \beta_1 Post_t + \beta_2 Treat_i + \beta_3 (Post_t \times Treat_i) + \varepsilon_{it} \quad (1)$$

where Y_{it} denotes the annual frequency of loan shark borrowing for respondent i at time t ; $Post_t$ is a binary indicator for the post-intervention period; $Treat_i$ indicates treatment group membership; and the interaction term $Post_t \times Treat_i$ captures the DiD estimator (β_3). A negative and statistically significant β_3 would indicate that the program reduces loan shark borrowing among beneficiaries beyond general time trends.

D. Diagnostic Tests and Validity

Huber–White robust standard errors were employed to address potential heteroskedasticity [19], [20]. Multicollinearity was assessed using the Variance Inflation Factor (VIF), with values ranging from 2.00 to 3.38 (mean = 2.59), confirming no serious collinearity [21]. The parallel trends assumption was validated through an independent-samples t-test on pre-intervention borrowing frequencies ($p = 0.10$), confirming no statistically significant baseline difference between groups. Data analysis was conducted using Excel and JASP [22].

IV. RESULTS AND DISCUSSION

A. Descriptive Statistics Results

Table I summarizes borrowing frequency from loan sharks before and after the intervention for both groups. Both groups exhibited declines in mean borrowing frequency: the treatment group’s mean decreased from 0.92 to 0.64, while the control group’s mean decreased from 1.28 to 0.76. Standard deviations also declined, indicating reduced variability in borrowing behavior post-intervention.

TABLE I. BORROWING FREQUENCY BEFORE AND AFTER PROGRAM INTERVENTION

Statistic	Govt. Program (n=109)		Coop. Loan (n=79)	
	Before	After	Before	After
Mean	0.92	0.64	1.28	0.76
Std. Dev.	1.49	1.20	1.43	0.98
Min	0.00	0.00	0.00	0.00
Max	5.00	5.00	5.00	2.00

B. Reasons for Continued Informal Borrowing

Table II presents the reasons respondents cited for continued loan shark borrowing post-intervention. Among government loan beneficiaries, loan amount limitation ranked highest ($n = 27$), followed by urgent financial needs ($n = 25$). Among cooperative loan borrowers, proximity and convenience dominated ($n = 27$), followed by urgent financial needs ($n = 20$). These findings indicated that non-price factors—rather than interest rate differentials—drive persistent informal borrowing.

C. Difference-in-Differences Regression Results

Table III presents the DiD regression estimates. The model is jointly significant ($F(3, 372) = 3.74, p = 0.011$), though the adjusted R^2 of 0.031 reflects limited explanatory power—typical for behavioral outcomes influenced by numerous unobserved factors [17].

The Post coefficient ($\beta_1 = -0.519, p < 0.05$) indicates a significant general decline of approximately 0.52 borrowing instances per year across all respondents following program implementation, irrespective of treatment status. The Treatment coefficient ($\beta_2 = -0.361, p > 0.05$) is not statistically significant, supporting the parallel trends assumption by confirming no meaningful pre-existing difference in borrowing frequency between groups.

TABLE II. REASONS FOR CONTINUED LOAN SHARK BORROWING POST-INTERVENTION

Reason	Govt.	Rank	Coop.	Rank
Loan amount limitation	27	1	6	5
Urgent financial needs	25	2	20	3.5
Proximity/convenience	12	3.5	27	1
Processing time/reqs.	12	3.5	10	2
Debt cycle/other debts	5	5	7	4

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TABLE III. DIFFERENCE-IN-DIFFERENCES REGRESSION RESULTS

Variable	Coefficient (SE)
Constant	1.278*** (0.160)
Post	-0.519** (0.194)
Treatment	-0.361 (0.215)
Post \times Treatment	0.244 (0.267)
Adj. R^2	0.031
F-statistic (p)	3.74 (0.011)

Critically, the DiD interaction term ($\beta_3 = 0.244, p > 0.05$) is positive and statistically insignificant, indicating that the government loan program did not produce a measurable additional reduction in loan shark borrowing for its beneficiaries relative to the control group.

E. Perceived Implications of the DiD Results

The significant Post coefficient confirmed that formal credit expansion at the community level is associated with reduced reliance on informal lenders, consistent with the theoretical prediction that easing credit supply constraints reduces demand for costly informal alternatives [5], [6]. This finding aligns with Layaoen and Takahashi’s [9] national-level evidence of

microfinance crowding out informal lending in the Philippines. However, the insignificant DiD interaction term revealed that the government program itself did not generate a differential treatment effect beyond this general trend. This finding has important theoretical and policy implications. From the credit rationing perspective, it demonstrated that lowering interest rates addresses only one dimension of credit access. The descriptive evidence in Table II confirmed that non-price constraints—particularly loan ceiling inadequacy and processing delays—constitute the primary barriers sustaining informal borrowing among program beneficiaries.

These results were also found consistent with the broader literature on the limitations of formal credit interventions. Wang et al. [15] and Febri et al. [23] caution that credit guarantee programs achieve impact only when designed to address the specific constraints facing targeted borrowers. The finding that proximity and convenience dominate among cooperative borrowers' reasons for continued informal borrowing echoes Zapata's [12] observation that transactional costs—not only financial costs—drive credit source decisions among Philippine microentrepreneurs.

The persistence of informal borrowing despite access to subsidized formal credit also reflected behavioral dimensions that credit rationing theory does not fully capture. Microentrepreneurs facing irregular cash flows may rationally prefer the immediacy and negotiability of informal loans, perceiving the total transaction cost—including time, documentation burden, and certainty of approval—as lower than that of formal alternatives [3], [4]. This behavioral lock-in to informal credit networks represents a dimension of credit constraint that purely supply-side interventions cannot address [8], [11].

V. LIMITATIONS OF THE PRESENT WORK

Several limitations should be acknowledged when interpreting the findings of this study. First, the low R^2 value (0.031) indicates that the model explains only approximately 3.1% of the total variance in loan shark borrowing frequency. While this is not uncommon in DiD models applied to behavioral outcomes—where the primary objective is unbiased estimation of the treatment coefficient rather than maximizing variance explained [17], [18]—it nevertheless signals that a substantial portion of borrowing behavior is driven by factors not captured in the current specification. Individual-level variables such as household income, asset ownership, financial literacy, risk preferences, and the strength of social ties with informal lenders likely exert considerable influence on credit source decisions but were not included as covariates. Future studies should incorporate these variables to improve model precision and provide a more comprehensive account of the determinants of informal borrowing.

Second, the study relies on self-reported, retrospective data for pre-intervention borrowing frequency, which introduces the possibility of recall bias. Respondents may not accurately remember the exact number of times they borrowed from loan sharks prior to the program, particularly if the recall period extends over several years. This limitation could attenuate the precision of both the pre-post comparisons and the DiD

estimates. Prospective longitudinal designs with periodic data collection would mitigate this concern.

Third, while simple random sampling was employed within each group, the treatment and control groups were drawn from borrowers of different loan products within the same province, raising the possibility that unobserved self-selection factors—such as entrepreneurial motivation, prior credit history, or preexisting relationships with cooperative staff—may differentiate the two groups in ways that the parallel trends assumption cannot fully account for. Although the pre-intervention t-test ($p = 0.10$) supports baseline comparability, it does not eliminate all potential confounders.

Fourth, the sample of 188 microentrepreneurs, while adequate for the DiD framework, limits statistical power to detect small but potentially meaningful treatment effects. The insignificant interaction term ($\beta_3 = 0.244$) may partly reflect insufficient sample size rather than a true absence of program impact. Replication with larger samples across multiple provinces would strengthen the external validity of the findings.

Finally, the study captures only the frequency of borrowing from loan sharks and does not examine loan amounts, interest rates paid, or the terms of informal credit arrangements. A more granular measurement of borrowing behavior—including the volume and cost of informal credit—would yield a richer understanding of whether the government program altered not just how often but how much and at what cost microentrepreneurs borrow from informal sources.

VI. CONCLUSION AND FUTURE WORK

This study provided causal evidence that formal credit expansion is associated with a significant general decline in loan shark borrowing among microentrepreneurs in Albay Province. However, the government-initiated low-interest cooperative loan program did not produce a statistically significant additional reduction for its direct beneficiaries compared to non-beneficiaries. This finding affirmed a key insight from credit rationing theory: reducing the price of formal credit is necessary but insufficient to displace entrenched informal lending when non-price constraints remain unaddressed.

The persistence of informal borrowing was driven by loan ceiling limitations that force microentrepreneurs to seek supplementary funding from loan sharks, processing delays that erode the timeliness advantage formal credit must offer, rigid repayment structures misaligned with irregular microenterprise income cycles, and the relational trust and convenience embedded in informal lending networks. These barriers demonstrated that credit constraints are multidimensional, and interventions targeting interest rates alone will yield limited displacement effects.

Based on these findings, several policy reforms are therefore recommended. Loan ceilings should be raised to reflect actual financing needs. Application and approval processes should be streamlined through simplified requirements and digitized systems. Repayment schedules should incorporate flexibility such as grace periods and adjustable installment amounts. Cooperative lenders should also invest in sustained community engagement to build borrower trust and counter the relational advantage of informal lenders.

Moreover, to address the limitations of the present work, several directions for future research are advised. For instance, longitudinal designs with repeated observations are still needed to determine whether the observed decline in informal borrowing is sustained over time. Experimental or staggered rollout designs could isolate the individual effects of specific reforms—such as higher ceilings versus faster processing—on borrowing displacement. Studies examining heterogeneous treatment effects across enterprise types, income levels, gender, and geographic contexts would also enable more precisely targeted interventions. Finally, future work should adopt richer outcome measures that capture not only borrowing frequency but also loan amounts, interest rates paid, and contractual terms, providing a more complete picture of how formal credit programs reshape informal borrowing behavior.

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REFERENCES

- [1] Department of Trade and Industry (DTI), "Micro, Small, and Medium Enterprise Development Plan 2023–2028," Bureau of Small and Medium Enterprise Development (BSMED), Republic of the Philippines, Manila, Philippines, Nov. 2024. [Online]. Available: https://dtiwebfiles.s3.ap-southeast-1.amazonaws.com/BSMED/MSMED+Plan+2023-2028/MSMED+Plan+2023-2028_approved+07Nov2024.v2.pdf
- [2] Y. Jin and S. Zhang, "Credit Rationing in Small and Micro Enterprises: A Theoretical Analysis," *Sustainability*, vol. 11, no. 5, p. 1330, Mar. 2019, doi: 10.3390/su11051330.
- [3] A. J. Bajarías and A. Y. Cabatingan, "Trapped in the Cycle: Lived Experiences of Nano-Entrepreneurs Borrowing from Loan Sharks in Cebu City," *jcasc*, pp. 1652–1660, Dec. 2025, doi: 10.64753/jcasc.v10i3.2639.
- [4] J. B. Labitad, "Borrowing from '5-6' Lenders: Examining the Link Between Street Vendors' Profiles and Informal Borrowing Practices," *Rand. Inter. Social Sci. J.*, vol. 6, no. 2, pp. 116–130, Apr. 2025, doi: 10.47175/rissj.v6i2.1126.
- [5] J. E. Stiglitz and A. Weiss, "Credit rationing in markets with imperfect information," *Amer. Econ. Rev.*, vol. 71, no. 3, pp. 393–410, Jun. 1981.
- [6] P. Brighi and M. Mussoni, "Credit Rationing and Financial Constraints," *The Bank-Business Relationship*. Springer Nature Switzerland, pp. 29–66, 2025. doi: 10.1007/978-3-031-91068-5_3.
- [7] N. Michelson, "Credit rationing during credit supply shock: Insights from loan level data," *International Review of Economics & Finance*, vol. 103, p. 104498, Oct. 2025, doi: 10.1016/j.iref.2025.104498.
- [8] T. Demont, "Microfinance spillovers: A model of competition in informal credit markets with an application to Indian villages," *European Economic Review*, vol. 89, pp. 21–41, Oct. 2016, doi: 10.1016/j.euroecorev.2016.06.003.
- [9] C. W. G. Layaoen and K. Takahashi, "Can microfinance lending crowd out informal lenders? Evidence from the Philippines," *J of Intl Development*, vol. 34, no. 2, pp. 379–414, Dec. 2021, doi: 10.1002/jid.3604.
- [10] A. T. Chala and J. Forssbaeck, "Does collateral reduce loan-size credit rationing? Survey evidence," Dept. of Economics, School of Economics and Management, Lund Univ., Lund, Sweden, Working Paper No. 2018:36, 2018. [Online]. Available: <https://www.econstor.eu/handle/10419/260265>
- [11] Y. Xu, Z. Peng, Z. Sun, H. Zhan, and S. Li, "Does digital finance lessen credit rationing?—Evidence from Chinese farmers," *Research in International Business and Finance*, vol. 62, p. 101712, Dec. 2022, doi: 10.1016/j.ribaf.2022.101712.
- [12] N. R. Zapata Jr., "Credit decision and rationing rules: A study of informal lenders in the Philippines," *Philippine Manage. Rev.*, vol. 13, 2006. [Online]. Available: <https://pmr.upd.edu.ph/index.php/pmr/article/view/146>
- [13] J. Chung and B. Kim, "Impact of microfinance on income generation: Evidence from a rural community - driven development programme in Myanmar," *J of Intl Development*, vol. 36, no. 3, pp. 1866–1879, Feb. 2024, doi: 10.1002/jid.3885.
- [14] D. Kanga, I. Soumare, and H. T. Chuigoua, "Financial sector development and microcredit to small firms," *Journal of International Financial Markets, Institutions and Money*, vol. 96, p. 102063, Oct. 2024, doi: 10.1016/j.intfin.2024.102063.
- [15] Y.-L. Wang, C.-H. Lee, and P.-S. Ko, "Do Loan Guarantees Alleviate Credit Rationing and Improve Economic Welfare?," *Sustainability*, vol. 12, no. 9, p. 3922, May 2020, doi: 10.3390/su12093922.
- [16] L. Dumlao, "Mandatory loan distribution and government guarantee in the Philippines," *Financial Credit Activity: Probl. Theory Pract.*, vol. 2, no. 55, pp. 48–63, 2024, doi: 10.55643/fcaptp.2.55.2024.4322.
- [17] C. Wing, K. Simon, and R. A. Bello-Gomez, "Designing Difference in Difference Studies: Best Practices for Public Health Policy Research," *Annual Review of Public Health*, vol. 39, no. 1, pp. 453–469, Apr. 2018, doi: 10.1146/annurev-publhealth-040617-013507.
- [18] A. Fredriksson and G. M. de Oliveira, "Impact evaluation using Difference-in-Differences," *RAUSP*, vol. 54, no. 4, pp. 519–532, Oct. 2019, doi: 10.1108/rausp-05-2019-0112.
- [19] P. J. Huber, "The behavior of maximum likelihood estimates under nonstandard conditions," in *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*, vol. 1, L. M. Le Cam and J. Neyman, Eds., Berkeley, CA, USA: University of California Press, 1967, pp. 221–233.
- [20] H. White, "A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity," *Econometrica*, vol. 48, no. 4, pp. 817–838, May 1980, doi: 10.2307/1912934.
- [21] J. H. Kim, "Multicollinearity and misleading statistical results," *Korean J Anesthesiol*, vol. 72, no. 6, pp. 558–569, Dec. 2019, doi: 10.4097/kja.19087.
- [22] JASP Team, JASP (Version 0.96.0) [Computer software]. 2026. [Online]. Available: <https://jasp-stats.org/>
- [23] F. P. Putra, P. B. S. W. Widodo, and Firmansyah, "The debate of impact from government credit guarantee on business development and non-performing loan of micro and small enterprises (MSEs): A literature survey," *Academy of Accounting and Financial Studies Journal*, vol. 23, no. 3, 2019.