

INDEBTEDNESS, FINANCIAL RISK, AND RESILIENCE OF INFORMAL MICROENTERPRISES: THE ROLE OF ADAPTATION MECHANISMS FROM THE ECONOMY OF RESOURCEFULNESS

MAKHROUT SAMIR¹ and AIT HBIBI AMINA²

¹PhD, Department of Economics, Faculty of Legal, Economic and Social Sciences, Cadi Ayyad University Marrakech, Morocco. Email: makhrou.samir@gmail.com; ORCID: <https://orcid.org/0009-0003-1705-9420>

²Professor of Economics, Faculty of Legal, Economic and Social Sciences, Cadi Ayyad University Marrakech, Morocco. Email: a.aithbibi@uca.ac.ma; ORCID: <https://orcid.org/0009-0004-7302-0579>

Abstract

This research examines the relationship between indebtedness, financial risk, and the survival of informal microenterprises through the lens of the "Economy of Resourcefulness" approach. Adopting a quantitative methodology with hypothetico-deductive reasoning, the study is based on a sample of 140 informal micro-entrepreneurs operating in the Marrakech-Safi region. The objective is to identify the adaptation mechanisms likely to strengthen the resilience of these economic units in a context characterized by income irregularity, liquidity tensions, and repayment constraints. Empirically, this study analyzes the effects of business flow diversification, rapid cost adjustment, negotiation with lenders, mutual aid networks, reversible micro-investments, and rapid inventory turnover. Using a Generalized Linear Model (GLM) with a Gamma distribution, the results show that diversification, cost adjustment, negotiation with lenders, reversible micro-investments, and inventory turnover contribute positively to resilience, whereas mutual aid networks show no statistically significant effect. Among the control variables, age exerts a negative effect, while education and income are positively associated with resilience. Gender and location show no significant influence. These results demonstrate that survival is not solely determined by the level of indebtedness, but by the ability of micro-entrepreneurs to develop adaptation strategies in response to financial risk.

Keywords: Indebtedness; Financial Risk; Organizational Resilience; Informal Micro-Enterprises; Economy of Resourcefulness; Adaptation Mechanisms; Business Survival.

JEL Classification: G32; G33; L26; O17; D22.

INTRODUCTION

Informal microenterprises occupy an important place in economies characterized by a strong presence of self-employment, subsistence activities, and weakly structured forms of production. Their operations often rely on limited financial resources, irregular income, and restricted access to formal financing mechanisms. In this context, indebtedness constitutes both a means of supporting business activity and a potential source of vulnerability. Recourse to credit, supplier advances, family loans, or other forms of informal financing can help preserve business continuity, replenish inventories, or cope with a temporary decline in income. However, the accumulation of financial obligations can also increase pressure on cash flow and expose micro-entrepreneurs to repayment difficulties. The question of survival therefore cannot be reduced to the level of debt alone. It also requires consideration of the adjustment capacities developed by entrepreneurs to cope with everyday constraints. Studying these mechanisms makes it possible to better understand how some

microenterprises maintain their activities despite uncertainty, while others remain more exposed to financial disruptions. While the literature primarily explains the resilience of informal microenterprises through structural factors—such as access to finance, human capital, or available resources—it pays limited attention to the adaptation mechanisms mobilized by entrepreneurs facing persistent financial constraints. This study contributes to addressing this gap by proposing a modeling framework based on the Economy of Resourcefulness approach. According to this perspective, financial resilience results from the ability of micro-entrepreneurs to transform constraints related to indebtedness and financial risk into adaptive practices that foster business continuity

In light of these gaps, this study seeks to address the following central question: **To what extent do the adaptation mechanisms derived from the Economy of Resourcefulness approach strengthen the financial resilience of informal microenterprises facing indebtedness and financial risk?**

This research aims to analyze the mechanisms through which informal microenterprises cope with the financial risk associated with indebtedness by mobilizing the Economy of Resourcefulness approach. This perspective considers that actors facing constraints develop adaptation tactics based on flexibility, the recombination of available resources, and the continuous adjustment of decisions. Applied to the context of informal microenterprises, it makes it possible to examine resilience through concrete management practices. The study therefore considers activity flow diversification, rapid cost adjustment, negotiation with lenders, strengthening of mutual support networks, reversible micro-investments, and rapid inventory turnover. These mechanisms are viewed as responses capable of reducing exposure to financial pressures and supporting business continuity. The objective is to assess their contribution to the resilience of informal microenterprises while taking into account certain characteristics of business owners and their environment. The research therefore seeks to clarify the conditions under which indebtedness remains compatible with business survival and those under which financial risk may further weaken entrepreneurial continuity.

The remainder of this paper is organized as follows: Section 1 reviews the literature and develops the research hypotheses. Section 2 describes the methodology and the econometric model. Section 3 presents the empirical results and robustness tests. Section 4 discusses the findings in light of the existing literature. Finally, Section 5 concludes the study and proposes policy recommendations.

1. Literature Review and Hypothesis Development

1.1 Literature Review

In order to situate this research within its scientific context, it is necessary to examine the primary works dedicated to this theme. In her research, MacGaffey (1991) demonstrated that the Economy of Resourcefulness should not be perceived as a mere passive response to poverty. Instead, it constitutes a dynamic and proactive economic system where individual ingenuity compensates for the failures of formal institutions to ensure the sustainability of activities.

Kouakou (2025) shows that prolonged experience of informality can leave a lasting imprint on access to credit, leading financial vulnerability to be considered the product of a trajectory rather than of a temporary need. This idea is consistent with Truong and Bui (2022), for whom the transition to formality does not immediately eliminate previous financing difficulties, particularly when the firm has not built a banking history. Mahadea and Zogli (2018) help explain the origin of this situation: restricted access to capital reduces opportunities for expansion, refinancing, and shock absorption in informal activities. Wanzala and Obokoh (2025) extend this reasoning by showing that limited financial inclusion constrains the diversity of resources that can be mobilized when revenues decline. The common implication is that survival depends less on the mere existence of debt than on the firm's capacity to access several sources of liquidity when needed. When this capacity remains persistently limited, a temporary cash-flow difficulty can turn into a lasting financial risk and compromise business continuity, particularly in an environment where internal margins remain weak and refinancing is neither automatic nor immediately accessible.

Nguyen and Canh (2021) show that small firms choose between no external financing, informal resources, formal credit, and combinations of these sources, thereby locating financial risk within the very structure of indebtedness. Nguyen et al. (2022) clarify that the shift toward informal finance varies according to the nature of the constraints encountered in accessing bank finance: barriers related to access, amounts, or conditions do not necessarily produce the same responses. Mago and Modiba (2022) then shed light on the function of these alternative channels, which support business creation, operations, growth, and livelihoods while revealing dependence on personal or community relationships. Yang et al. (2023), however, show that this financing architecture becomes more fragile when interest-rate risk or a public health emergency simultaneously alters financing costs and liquidity needs. It follows that informal indebtedness can sustain activity when banks remain inaccessible, but its contribution to survival depends on creditor diversification, resource stability, and the capacity to reorganize financial obligations when conditions change.

Senyo et al. (2023) show that financial technologies can move informal firms away from the economic margins by improving their access to payments, liquidity, and financing, thereby expanding their capacity to respond to income interruptions. Urueña-Mejía et al. (2023), however, emphasize that the availability of financial products is not sufficient: their contribution depends on their effective use by microenterprises and on how these firms organize their financial flows. Rojas Cama et al. (2024) place this relationship in a broader framework by establishing that the scale of the informal sector is linked to the degree of financial inclusion, showing that the vulnerability of small units also reflects the configuration of the financial system. Kanga et al. (2024) complement this perspective by emphasizing that financial development conditions the supply of microcredit available to small firms. Taken together, these studies imply that survival does not simply result from increased access to debt. It depends on the quality of the available instruments, their use in daily management, and the institutional environment that makes it possible to transform financing into a sustainable capacity to adjust to shocks.

Jimi et al. (2019) show that easing credit constraints can increase productivity when financed resources are used to improve productive capacities, which calls for a distinction between debt that supports activity and debt that merely increases financial obligations. Semegn and Bishnoi (2021) reinforce this distinction by establishing that loan size, savings, and entrepreneurial training are positively associated with the performance of micro and small enterprises. Al-Maamari et al. (2025) lead to the same conditional reasoning: microcredit can support operations and investment, but it increases fragility when it becomes disproportionate to income. Lahiri and Daramola (2023) add that the effects of a capital constraint vary according to the initial resources of the households that support microenterprises. The common implication is that the same level of indebtedness does not generate an identical level of risk for all informal units. Its sustainability depends on the use of credit, saving capacity, management skills, and mobilizable assets. Survival therefore depends on the alignment between financial obligations, future income, and complementary resources available in times of difficulty, particularly when household income compensates for business deficits.

Malik et al. (2020) clearly show how a shock can transform previously manageable debt into an immediate threat to survival: the collapse in sales during the health crisis led a large majority of surveyed borrowers to anticipate an inability to repay. Zhang and Sogn-Grundvåg (2022) explain why this transmission is stronger among financially constrained firms, since limited access to financing reduces their capacity to temporarily cover expenses when revenues disappear. Chundakkadan et al. (2022) extend this mechanism by showing that financially constrained firms suffer more severely from the consequences of the shock, while public support can mitigate part of the losses. Dörr et al. (2022) then make it possible to distinguish a persistently non-viable activity from a firm that is temporarily unable to meet its obligations because of a liquidity shortage. These results imply that debt-related risk emerges primarily when declining revenues, weak reserves, and restricted access to temporary resources accumulate. In such a case, a temporary cash-flow problem can develop into default, insolvency, and the permanent interruption of activity before the business is economically condemned in a lasting sense.

Kaya (2024) shows that payment delays can trigger a cumulative sequence in which declining liquidity increases financing needs while simultaneously worsening access to credit. Liu et al. (2022), in the context of Chinese SMEs, show that exposure to shocks deteriorates credit lines, particularly for firms without prior banking relationships, while difficulties can also be transmitted through supply chains. Castaldo et al. (2023) link this fragility to the financing structure by showing that the effect of credit on resilience varies across sectors and according to the characteristics of young firms. Iwasaki et al. (2022) broaden the explanation by establishing that institutional quality and financial development influence the probability of small-firm survival. The implication is that the vulnerability of an informal microenterprise may originate beyond its immediate boundaries: a customer who pays late, a partner who withdraws, or an underdeveloped financial system can reduce available liquidity. Debt then becomes more risky when the firm can neither sustainably refinance its obligations nor easily adjust their structure to the duration of the shock experienced.

Bongomin et al. (2024) show that access to microcredit supports survival more effectively when credit counseling improves the understanding and management of obligations, indicating that debt does not protect the firm independently of decision-making capabilities. Gatto and Sadik-Zada (2022) place this function within a resilience perspective by showing that microfinance can help absorb the consequences of adverse events, provided that future repayments remain compatible with income. Mbeni and Yeboah (2024) lead to the consideration of informal entrepreneurs' survival as an adaptation process in which financial resources accompany adjustments in business activity rather than guaranteeing continuity on their own. Berkel et al. (2025) reinforce this distinction by examining the effect of a liquidity injection without repayment obligations following a disaster. Their contribution shows that the immediate need for capital must be separated from the future risk created by debt. Taken together, these studies imply that financing supports survival when it provides the time and resources required for a viable adjustment. It increases fragility when it merely prolongs a persistently weakened activity or adds long-term financial burdens to an insufficient recovery.

Wang et al. (2025) show that credit granted by non-financial firms can support the local survival of SMEs while creating broader risks when obligations become interconnected. Zylfijaj and Nikoloski (2021) make it possible to relate this ambivalence to informality: financial and institutional barriers contribute to performance gaps and reduce the capacity of informal firms to maintain or develop their activities. Mago and Modiba (2022) explain why these units nevertheless continue to rely on informal channels, since such channels finance business creation, operations, and livelihoods when banking solutions remain limited. Iwasaki et al. (2022) emphasize that survival also depends on the quality of institutions and the level of financial development that shape these choices. These contributions converge toward a nonlinear relationship between indebtedness and continuity. The absence of credit can prevent investment, adjustment, and shock absorption, whereas costly, concentrated, or difficult-to-restructure debt can accelerate failure. The survival of informal microenterprises therefore depends on the balance between access to liquidity, repayment sustainability, source diversification, and the capacity of the financial environment to limit the long-term accumulation of vulnerabilities.

1.2 Research hypotheses

The Economy of Resourcefulness approach, as highlighted by De Certeau (1980), describes how actors facing constraints develop everyday tactics to circumvent rules, improvise solutions, and ensure their economic survival. This perspective shows that, in informal settings, individuals do not act merely as rational agents, but as tacticians capable of assembling, repurposing, and recombining available resources to sustain their activity. Adapted to the analysis of indebtedness and financial risk among informal microenterprises, this approach reveals that resilience does not derive solely from financial capacity, but also from an ability to manage unforeseen circumstances. Micro-entrepreneurs use strategies involving risk dispersion, continuous negotiation with lenders, rapid expenditure adjustments, and reversible micro-investments to absorb shocks. Indebtedness therefore becomes an ambivalent resource, sometimes enabling greater freedom when it helps stabilize the activity,

but sometimes becoming dangerous when it increases vulnerability. The approach thus makes it possible to understand that survival depends less on the volume of debt than on the ability to improvise room for maneuver in the face of financial uncertainty. From this perspective, the main practices through which micro-entrepreneurs can preserve their activity in the face of debt pressures and financial risk can be grouped as follows:

- **Income diversification and cost flexibility:** Informal microenterprises strengthen their resilience by multiplying complementary micro-activities that are often independent of one another. This diversification creates a natural buffer against temporary losses and limits dependence on a single source of income. In the event of financial pressure or an imminent repayment obligation, the entrepreneur can redirect effort toward the most profitable activity at that particular time. This plurality of small income streams acts as an informal shock absorber, reducing vulnerability and stabilizing the financial balance. It also makes it possible to spread risks by preventing a single shock from causing total collapse. This capacity is complemented by the rapid adjustment of current expenses. Informal micro-entrepreneurs can suspend certain expenditures, renegotiate purchases, reduce inventories, or redirect their offerings in response to fluctuations in income. This flexibility makes it possible to absorb periods of pressure caused by indebtedness and maintain a minimum level of liquidity. Cost adjustment therefore constitutes a tactical reconfiguration of priorities based on daily observation of demand and risks, protecting the activity against sudden disruptions.
- **Financial negotiation and mobilization of mutual support networks:** Many micro-entrepreneurs develop relationships of trust, sometimes informal, with their creditors, allowing them to adjust repayments according to sales cycles. Such negotiation, whether concerning duration, penalties, or payment deadlines, constitutes a means of preserving a degree of financial flexibility. It can prevent the accumulation of debts that are difficult to repay and reduce pressure associated with financial risk. The ability to mobilize dialogue as a strategic resource can therefore support business continuity, particularly when lenders accept personalized arrangements. This practice also operates within a social fabric composed of neighbors, suppliers, customers, and family members. These networks can provide advance payments, small loans, shared equipment, or occasional assistance that helps absorb certain shocks. They also facilitate the circulation of information on market opportunities or difficulties. Relational capital therefore constitutes a resource capable of supporting financial adjustments and reducing microenterprises' exposure to economic fluctuations.
- **Investment reversibility and inventory fluidity:** To limit exposure to financial risk, some micro-entrepreneurs favor small-scale investments that can easily be interrupted, transformed, or resold. This practice makes it possible to test an activity without becoming exposed to heavy and difficult-to-reverse financial commitments. In the event of debt-related pressure, the entrepreneur can quickly abandon an unprofitable activity and recover part of the resources invested. This reversibility limits losses, reduces the risk of becoming locked into costly choices, and preserves the possibility of rapid reorientation. It is

complemented by accelerated inventory turnover aimed at generating liquidity on a regular basis. Rapid movement of goods limits capital immobilization, reduces losses associated with obsolescence, and facilitates the accumulation of available resources to meet repayment obligations. During periods of financial pressure, the entrepreneur can also quickly sell part of the inventory in order to preserve cash flow. The combination of reversible investments and fluid inventory management thus makes it possible to maintain room for adjustment in the face of debt and unforeseen events.

Applied to this study, the Economy of Resourcefulness approach leads to the view that the resilience of informal microenterprises depends on their capacity to combine several forms of adaptation in response to the constraints generated by indebtedness and financial risk. Activity diversification and cost adjustment help stabilize financial flows, while negotiation with lenders and mutual support networks can contribute to easing repayment constraints and mobilizing complementary resources. At the same time, reversible micro-investments and rapid inventory turnover preserve liquidity and maintain the possibility of quickly redirecting the activity when conditions become unfavorable. The study thus examines the respective contribution of these various practices to the resilience of informal microenterprises. By formalizing the practices contributing to the resilience of informal microenterprises as adaptation mechanisms, we sought to quantify their effectiveness in the face of financial risk. To this end, we formulate the following research hypotheses:

H1: Diversification of activity flows has a positive impact on resilience.

H2: The capacity for rapid cost adjustment has a positive impact on resilience.

H3: Negotiation with lenders has a positive impact on resilience.

H4: Strengthening mutual support networks has a positive impact on resilience.

H5: Reversible micro-investments have a positive impact on resilience.

H6: Rapid inventory turnover has a positive impact on resilience.

2. Research Methodology

The study adopts a **quantitative, hypothetico-deductive approach**, aiming to quantify the impact of adaptation mechanisms on the resilience of informal microenterprises.

2.1 Sample presentation

The study is based on a sample of 140 informal micro-entrepreneurs operating in the Marrakech-Safi region. Although modest in size, this sample provides sufficient statistical power for the exploration of specific behaviors in hard-to-reach populations (Cochran, 1977). The participants were selected using non-probability snowball sampling, given the particular difficulties involved in identifying and reaching microenterprises operating in the informal sector. The absence of a comprehensive sampling frame, the limited administrative visibility of many activities, the mobility of some entrepreneurs, the dispersion of economic units across urban and rural areas, and the reluctance of several participants to provide information about their debts, income, and financial practices limited the use of a conventional

probability-based procedure. Data collection began with an initial group of micro-entrepreneurs who met the study criteria, particularly engagement in an informal activity and exposure to indebtedness or financing constraints. These initial respondents then facilitated contact with other entrepreneurs within their professional, commercial, or local networks. The process continued progressively until 140 usable questionnaires were obtained. The use of snowball sampling therefore facilitated access to a population that is difficult to identify directly and reduced some of the trust-related constraints associated with the collection of financial information. However, because this method is not based on random sampling, the results should be interpreted primarily in light of the observed relationships between adaptation practices and resilience, without claiming strict statistical generalizability to the entire population of informal microenterprises in Marrakech-Safi.

2.2 Data Collection

Data were collected through a structured questionnaire administered via face-to-face interviews. The choice of face-to-face administration proved crucial to ensuring the reliability of responses, given the sensitivity of debt-related questions and the natural distrust informal actors often hold toward surveys. Total anonymity was guaranteed to mitigate social desirability bias.

2.3 Model Variables

The model incorporates three types of variables:

Dependent Variable: Financial Resilience (RESI), measured by a composite index assessing the unit's ability to maintain operations and honor commitments despite liquidity shocks.

Explanatory Variables (Adaptation Mechanisms): Six levers derived from the Economy of Resourcefulness are tested: Business Diversification (DIVA), Cost Adjustment (ADJC), Negotiation with Lenders (NEGO), Mutual Aid Networks (RESE), Reversible Micro-investments (MREV), and Inventory Turnover (ROTS). Each mechanism is measured using a Likert scale.

Control Variables: To isolate the effect of adaptation mechanisms, we control for individual characteristics, namely age (AGEE), gender (GENR), and education (EDUC), as well as socioeconomic and contextual factors, including income (REVE) and location (LOCA).

2.4 Econometric Model

The research model aims to examine the determinants of the resilience of informal microenterprises facing indebtedness and financial risk. Based on the Economy of Resourcefulness approach, it considers that business continuity depends on entrepreneurs' capacity to recombine their resources and adjust their practices in response to constraints. The model includes six explanatory dimensions: diversification of activity flows, rapid cost adjustment, negotiation with lenders, strengthening of mutual support networks, reversible micro-investments, and rapid inventory turnover. These dimensions make it possible to assess the adaptive capacities mobilized to preserve liquidity, reduce financial pressures, and maintain business activity. The model also incorporates individual and contextual

characteristics in order to identify the factors that facilitate or constrain the resilience of informal microenterprises.

$$RESI = \beta_0 + \beta_1DIVA + \beta_2ADJC + \beta_3NEGO + \beta_4RESE + \beta_5MREV + \beta_6ROTS + \gamma_1AGEE + \gamma_2EDUC + \gamma_3GENR + \gamma_4REVE + \gamma_5LOCA + \varepsilon$$

RESI: the resilience of informal microenterprises constitutes the dependent variable of the model. It refers to the firm's capacity to maintain business continuity, absorb financial pressures related to indebtedness, and adapt to disruptions that may threaten its survival. DIVA: activity diversification refers to the microentrepreneur's capacity to distribute income sources across several complementary activities in order to reduce dependence on a single source of revenue and limit exposure to economic fluctuations. ADJC: cost adjustment represents the microentrepreneur's capacity to rapidly modify current expenses and commitments in response to changes in income, cash-flow constraints, and repayment obligations. NEGO: negotiation with lenders refers to the microentrepreneur's capacity to discuss and adapt the repayment conditions of debts, including payment schedules, deadlines, or payment arrangements, in order to reduce financial pressures. RESE: the mutual support network refers to the set of family, social, and professional relationships capable of providing the micro-entrepreneur with financial, material, informational, or commercial assistance during periods of difficulty.

MREV: reversible micro-investments refer to small-scale investments that can be interrupted, transformed, resold, or rapidly redirected in order to limit financial losses and preserve business flexibility. ROTS: inventory turnover represents the microenterprise's capacity to renew and sell its goods rapidly in order to reduce capital immobilization, preserve liquidity, and generate financial resources more regularly. The dependent variable RESI and the six main variables DIVA, ADJC, NEGO, RESE, MREV, and ROTS are each measured using five items. Each item is assessed on a five-point Likert scale ranging from 1 to 5. After data collection, the arithmetic mean of the five items associated with each construct is calculated in order to obtain a composite score representing the corresponding variable. AGE: the age of the business owner, measured in years. EDUC: the education level of the business owner, measured according to the level of educational attainment. GENR: the gender of the business owner, represented by a binary variable. REVE: the income level of the micro-entrepreneur or the microenterprise. LOCA: the location of the business activity, represented by binary variable distinguishing urban and rural areas.

2.5 Model choice

The use of a generalized linear model based on a Gamma distribution (GLM Gamma) is justified by the strictly positive and continuous nature of the resilience score used as the dependent variable. In this study, resilience is measured using five items assessed on a Likert scale ranging from 1 to 5 and subsequently aggregated by calculating their mean, thereby producing a quantitative indicator that can take decimal values within a positive domain. When the distribution of this score is skewed and exhibits non-constant variance, the assumptions of normality and homoskedasticity associated with the conventional linear

model may not be satisfied. The GLM Gamma therefore makes it possible to directly model a positive variable whose dispersion changes with the observed mean level. In this study, we specifically employ the logarithmic link function to ensure the strict positivity of the predicted resilience scores and to allow the estimated coefficients to be interpreted, thereby facilitating a more intuitive economic analysis of the adaptation mechanisms..

3. Results

3.1 Robustness analysis

The results of the Ramsey RESET test indicate that the functional specification of the model does not exhibit any statistically significant misspecification. The t-statistic associated with the squared fitted values has a probability of 0.3732, which is above the conventional 5% significance level. The F-test leads to the same conclusion, with an identical probability of 0.3732, while the likelihood ratio test reports a probability of 0.3489. These results therefore do not allow rejection of the null hypothesis of correct model specification. Furthermore, the limited difference between the residual sums of squares of the restricted and unrestricted models shows that adding the quadratic term does not significantly improve the model fit. The model therefore appears to be correctly specified, with no statistical indication of an inappropriate functional form or omitted nonlinearity.

Table 1: Ramsey RESET test of the model's functional specification

Ramsey RESET Test Equation: UNTITLED Specification: RESI C DIVA ADJC NEGO RESE MREV ROTS AGEE EDUC GENR REVE LOCA Omitted Variables: Squares of fitted values			
	Value	df	Probability
t-statistic	0.893630	127	0.3732
F-statistic	0.798574	(1, 127)	0.3732
Likelihood ratio	0.877562	1	0.3489
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	1.641837	1	1.641837
Restricted SSR	262.7489	128	2.052726
Unrestricted SSR	261.1070	127	2.055961
LR test summary:			
	Value		
Restricted LogL	-242.7203		
Unrestricted LogL	-242.2816		

Source: Authors.

The variance inflation factor results indicate the absence of any significant multicollinearity problem among the explanatory variables included in the model. The centered VIF values all remain close to one and well below the thresholds generally used to detect problematic

collinearity. The highest value concerns RESE, with a VIF of 1.260, followed by AGEE with 1.210 and MREV with 1.151. By contrast, ADJC records the lowest value, at 1.042. This limited dispersion indicates that the variables included in the model provide sufficiently distinct information and that the linear relationships among them remain weak. Although the uncentered VIF values are higher, they do not call this conclusion into question. The estimated coefficients can therefore be interpreted without any notable risk of instability attributable to multicollinearity.

Table 2: Variance inflation factors (VIF) for the model variables

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.537759	36.67624	NA
DIVA	0.186619	4.046612	1.044557
ADJC	0.240223	5.632227	1.042041
NEGO	0.177772	4.122364	1.097572
RESE	0.216230	5.049789	1.259710
MREV	0.240826	5.657096	1.151004
ROTS	0.215698	5.241866	1.111077
AGEE	0.204606	5.016448	1.210260
EDUC	0.189994	4.429139	1.116584
GENR	0.205390	4.716079	1.083004
REVE	0.168820	4.018869	1.077959
LOCA	0.186483	4.445650	1.066050

Source: Authors.

The results of the Breusch–Pagan–Godfrey test indicate the absence of statistically significant heteroskedasticity in the model residuals. The F-statistic reports a probability of 0.5491, which is well above the conventional 5% significance level. The Obs*R² statistic leads to the same conclusion, with a probability of 0.5323, while the Scaled Explained SS statistic reports a probability of 0.9876. These results therefore do not allow rejection of the null hypothesis of homoskedasticity. The variance of the errors can thus be considered sufficiently stable across observations, with no indication of systematic variation related to the explanatory variables. The absence of heteroskedasticity supports the reliability of the estimated standard errors and allows the statistical interpretation of the model coefficients to proceed without requiring a specific correction for residual variance.

Table 3: Breusch–Pagan–Godfrey heteroskedasticity test

Test Statistic	Statistic Value	Degrees of Freedom	p-value
F-statistic	0.893022	F(11, 128)	0.5491
Obs*R-squared	9.978384	$\chi^2(11)$	0.5323
Scaled Explained SS	3.211414	$\chi^2(11)$	0.9876

Source: Authors.

The distribution of the residuals appears broadly consistent with the assumption of normality. The mean, equal to 0.0233, and the median, equal to 0.0077, remain close to zero, indicating the absence of any substantial systematic bias in the errors. The skewness coefficient of

0.0378 reflects an almost perfectly symmetrical distribution. The kurtosis value of 2.2122 remains slightly below the reference value of three, without, however, revealing any pronounced distributional anomaly. The Jarque–Bera test confirms this assessment, with a statistic of 3.6541 and a probability of 0.1609, which is above the conventional 5% significance level. The null hypothesis of residual normality therefore cannot be rejected. These results support the validity of the statistical inferences derived from the estimated model.

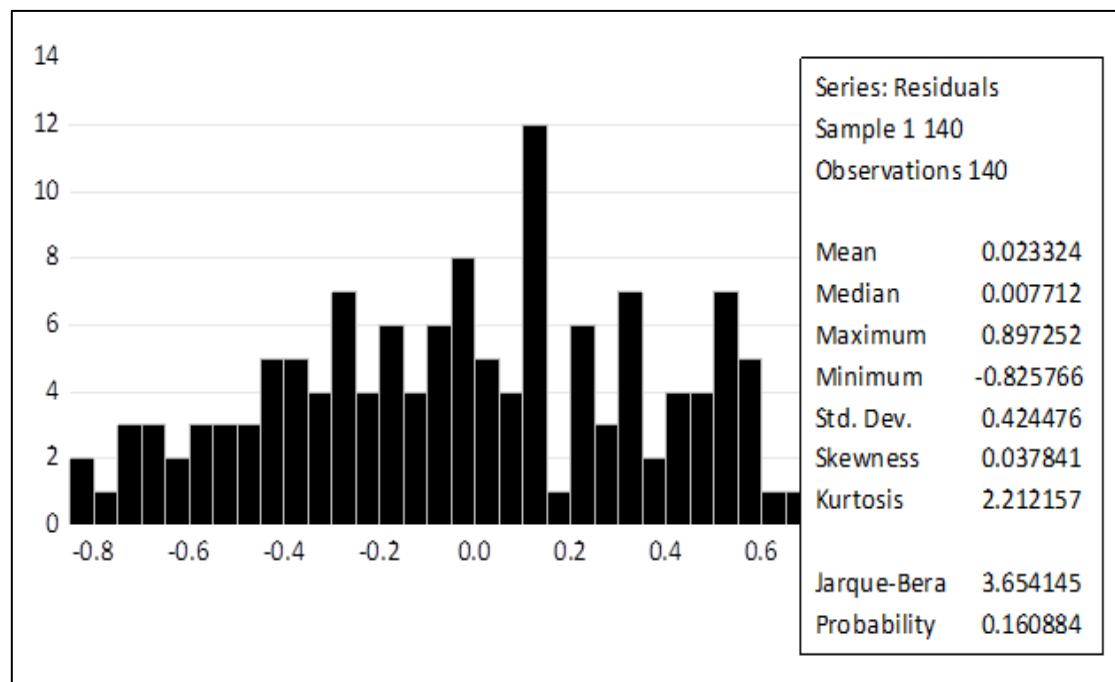


Figure 1: Residual distribution and Jarque–Bera normality test

Source: Authors.

The Hat matrix statistic shows that the leverage levels of the observations remain generally below the critical threshold represented by the horizontal line. The values fluctuate mainly between 0.05 and 0.12, while a few observations occasionally reach levels close to 0.14 without exceeding the approximate limit of 0.17. This pattern indicates that no observation exhibits excessively high leverage likely to exert a disproportionate influence on the estimation of the coefficients. Despite some variation across observations, the dispersion remains relatively regular throughout the sample. The absence of any exceedance of the critical threshold therefore reduces the risk that the model results are driven by a limited number of atypical cases. The overall distribution of the values thus supports the stability of the estimates with respect to statistical leverage.

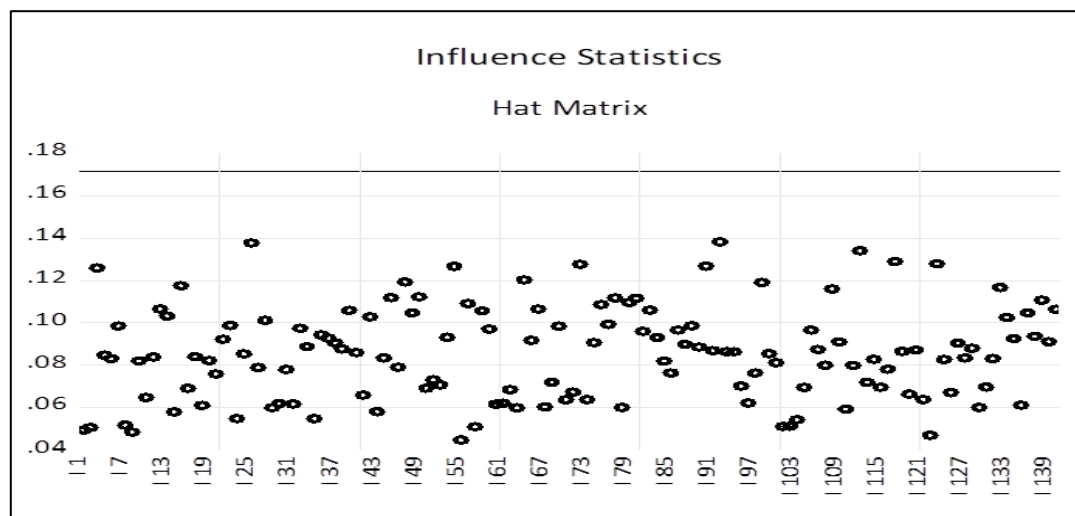


Figure 2: Observation influence statistics based on the Hat matrix

Source: Authors.

Overall, the various diagnostic tests confirm the statistical robustness of the estimated model. The Ramsey RESET test reveals no functional specification error, as the probabilities associated with the t-statistic ($p = 0.3732$), the F-test ($p = 0.3732$), and the likelihood ratio test ($p = 0.3489$) are all above the 5% significance level. The variance inflation factors also indicate the absence of problematic multicollinearity, since the centered VIF values remain close to one and range only from 1.042 to 1.260, levels that are well below the usual thresholds. The Breusch–Pagan–Godfrey test, for its part, confirms the absence of statistically significant heteroskedasticity, with probabilities of 0.5491 for the F-statistic, 0.5323 for the Obs $\cdot$ R² statistic, and 0.9876 for the Scaled Explained SS statistic. The normality of the residuals is also supported by the Jarque–Bera test, whose probability of 0.1609 does not allow rejection of the null hypothesis of normality at the 5% significance level. Finally, examination of the Hat matrix shows that no observation exceeds the critical leverage threshold, ruling out the presence of observations exerting excessive influence on the estimates. The convergence of these results indicates that the model is correctly specified, free from significant multicollinearity and heteroskedasticity, characterized by normally distributed residuals, and relatively insensitive to high-leverage observations. The model can therefore be considered statistically robust and sufficiently stable to support the interpretation of the econometric results.

3.2 Regression results

The table presents the estimation results of the model explaining microenterprise resilience, as measured by the dependent variable RESI. Given the continuous, positive nature of this variable, the estimation is based on a generalized linear model with a Gamma distribution. The analysis is conducted on a sample of 140 observations retained for estimation. The procedure was performed using the Newton-Raphson algorithm supplemented by Marquardt

steps to ensure model convergence. Convergence was achieved after four iterations, indicating that the optimization process reached a stable solution. The dispersion parameter was calculated using the Pearson chi-square statistic, while the coefficient variance-covariance matrix was determined from the observed Hessian matrix. The results therefore make it possible to examine the sign and statistical significance of the relationships between the main explanatory dimensions, the control variables, and the level of microenterprise resilience. They provide the basis for evaluating the formulated hypotheses and interpreting the factors associated with the capacity of these economic units to maintain and adapt their activities in response to the difficulties encountered.

DIVA has a positive coefficient and a statistically significant effect at the 1% significance level ($p = 0.0095$). This result shows that diversification of activity flows is positively associated with the resilience of informal microenterprises. Hypothesis H1 is therefore accepted. The implication is that engaging in multiple complementary activities enables microentrepreneurs to distribute risks more effectively and reduce their dependence on a single source of income when facing debt-related pressures. ADJC has a positive coefficient and a statistically significant effect at the 5% significance level ($p = 0.0301$). The capacity for rapid cost adjustment therefore contributes positively to the resilience of informal microenterprises. Hypothesis H2 is thus accepted. The implication is that the ability to quickly reduce, postpone, or reorganize certain expenses helps micro-entrepreneurs preserve liquidity and maintain their activities during periods of financial pressure. NEGO has a positive coefficient and a statistically significant effect at the 1% significance level ($p = 0.0087$). This result confirms that a greater capacity to negotiate with lenders is positively associated with the resilience of informal microenterprises. Hypothesis H3 is therefore accepted. The implication is that greater flexibility regarding deadlines, repayment arrangements, or repayment schedules can reduce financial pressure and support business continuity.

RESE has a negative coefficient, but its effect is not statistically significant at the 1%, 5%, or 10% significance levels ($p = 0.5761$). Strengthening mutual support networks therefore has no statistically established effect on the resilience of informal microenterprises. Hypothesis H4 is rejected. The implication is that the existence of a social or relational network does not necessarily protect the business when the resources that can be mobilized through that network remain limited or irregular. MREV has a positive coefficient and a statistically significant effect at the 5% significance level ($p = 0.0161$). Reversible micro-investments therefore contribute positively to the resilience of informal microenterprises. Hypothesis H5 is thus accepted. The implication is that small, flexible, and easily reversible financial commitments help limit potential losses and preserve the capacity to redirect the business in situations of uncertainty. ROTS has a positive coefficient and a statistically significant effect at the 1% significance level ($p = 0.0009$). Rapid inventory turnover therefore has a positive effect on the resilience of informal microenterprises. Hypothesis H6 is accepted. The implication is that the rapid movement of goods reduces capital immobilization and facilitates the continuous generation of liquidity required to meet current expenses and repayment obligations.

AGEE has a negative coefficient and a statistically significant effect at the 5% significance level ($p = 0.0100$). The age of the business owner is therefore negatively associated with the resilience of informal microenterprises. The implication is that older business owners may experience greater difficulty in rapidly modifying their practices, diversifying their activities, or adopting frequent financial adjustments in response to economic pressures. EDUC has a positive coefficient and a statistically significant effect at the 1% significance level ($p = 0.0056$). The education level of the business owner therefore contributes positively to the resilience of informal microenterprises. The implication is that a higher level of education may facilitate risk assessment, resource management, and the adaptation of financial decisions to debt-related constraints. GENR has a negative coefficient, but its effect is not statistically significant at the 1%, 5%, or 10% significance levels ($p = 0.3932$). The gender of the business owner therefore does not provide a statistically established explanation of differences in resilience among informal microenterprises. The implication is that survival capacities appear to depend more on management practices and adaptation mechanisms than on the gender of the business owner.

REVE has a positive coefficient and a statistically significant effect at the 5% significance level ($p = 0.0431$). Income level is therefore positively associated with the resilience of informal microenterprises. The implication is that a higher income base provides additional financial room to absorb shocks, meet financial commitments, and maintain business continuity. LOCA has a positive coefficient, but its effect is not statistically significant at the 1%, 5%, or 10% significance levels ($p = 0.1817$). Urban or rural location therefore has no statistically established effect on the resilience of informal microenterprises. The implication is that territorial differences alone are not sufficient to determine survival capacity, which appears to depend more on the financial and organizational tactics mobilized by micro-entrepreneurs.

4. Discussion

The results first show that diversification of activity flows improves the resilience of informal microenterprises. This finding is consistent with Nguyen and Canh (2021), who show that small firms combine different sources of resources in order to reduce their exposure to financial constraints, as well as with Wanzala and Obokoh (2025), for whom limited diversity in the resources that can be mobilized increases vulnerability when revenues decline. It also extends the findings of Mahadea and Zogli (2018), according to whom restricted access to capital reduces the capacity to absorb shocks. In the Moroccan context, this relationship can be explained by the irregularity of income that characterizes many informal activities. The coexistence of several small sources of revenue can temporarily offset a decline in one of them and preserve a minimum repayment capacity. Such diversification should not, however, be equated with the unstructured multiplication of activities. It implies a distribution of income sources that limits dependence on a single product, customer, or sales period. For Morocco, the implication is that support mechanisms should encourage the gradual diversification of markets and complementary activities rather than focusing solely on increasing access to credit. Such an approach would reduce the risk that a temporary decline

in sales transforms manageable debt into a lasting financial difficulty. The positive effect of rapid cost adjustment on resilience is consistent with studies showing that financial difficulties become more severe when firms cannot adapt their expenses to declining revenues. Malik et al. (2020) show that a sales shock can quickly make repayments difficult, while Zhang and Sogn-Grundvåg (2022) emphasize that financially constrained firms have less room to temporarily cover their expenses. Dörr et al. (2022) clarify this mechanism by distinguishing a non-viable activity from a firm temporarily facing a liquidity shortage. From this perspective, the capacity to reduce, postpone, or reorganize certain expenses constitutes a means of preserving business continuity. The positive result concerning negotiation with lenders follows the same logic. The significance of negotiating with lenders, as underscored by our findings, aligns with the research of Guérin (2014) regarding the relational dimension of informal debt. Survival, in this context, hinges on the entrepreneur's capacity to renegotiate their obligations, effectively transforming a rigid financial constraint into a flexible and manageable social commitment. Nguyen et al. (2022) and Mago and Modiba (2022) show that entrepreneurs rely on diversified financial channels when formal financing conditions become restrictive. For Moroccan micro-entrepreneurs, repayment schedule flexibility therefore appears to be as important as initial access to finance. Microfinance policies could incorporate more rescheduling options adapted to income fluctuations in order to prevent a temporary payment delay from leading to the accumulation of penalties, recourse to additional debt, and a cumulative deterioration of the financial situation.

The absence of a statistically established effect of mutual support networks qualifies the findings of Mago and Modiba (2022), who emphasize the role of personal and community relationships in financing informal activities. This result does not mean that networks are without value, but suggests that their contribution may remain limited when network members themselves have restricted financial resources. This interpretation is indirectly consistent with Lahiri and Daramola (2023), who show that the effects of capital constraints depend on the resources initially available within households supporting microenterprises. In the Moroccan context, family solidarity, supplier advances, and local assistance may address a temporary difficulty without necessarily providing the amounts or duration required to absorb a prolonged shock. By contrast, the positive effect of reversible micro-investments is consistent with Jimi et al. (2019), Semegn and Bishnoi (2021), and Al-Maamari et al. (2025), who distinguish financing intended to strengthen business activity from indebtedness that merely increases obligations. For Morocco, this result supports assistance oriented toward gradual, low-value, and rapidly adaptable investments, allowing entrepreneurs to experiment with an activity without permanently immobilizing already limited resources.

The positive effect of rapid inventory turnover shows that resilience also depends on the capacity to quickly transform committed resources into available liquidity. This result is consistent with Kaya (2024), who shows that payment delays can trigger a cumulative sequence of financial pressures, as well as with Liu et al. (2022), for whom liquidity difficulties can be transmitted through commercial relationships. It also agrees with Bongomin et al. (2024) and Gatto and Sadik-Zada (2022), who show that financing supports survival more effectively when it remains compatible with future income flows. The results

relating to the control characteristics complement this interpretation. The negative effect of age may reflect a lower adjustment capacity among some business owners when faced with changing commercial practices, while the positive effect of education is consistent with the importance that Bongomin et al. (2024) attach to counseling and the capacity to manage financial obligations. The positive effect of income confirms that the availability of complementary resources improves shock absorption. The absence of effects related to gender and location nevertheless indicates that resilience depends more on management practices than on these characteristics. In Morocco, these results support simple financial training, differentiated assistance according to business owners' experience, and management tools adapted to inventory turnover, cash-flow monitoring, and the prevention of over-indebtedness.

CONCLUSION

This research examined the relationship between indebtedness, financial risk, and the survival of informal microenterprises through the Economy of Resourcefulness approach. By formalizing these practices aimed at fostering the resilience of informal microenterprises as adaptation mechanisms, we sought to quantify their effectiveness in the face of financial risk

Empirically, using a Generalized Linear Model (GLM) with a Gamma distribution and a logarithmic link function, the results demonstrate that the resilience of these economic units depends primarily on micro-entrepreneur's capacity to develop flexible responses to financial constraints and uncertainty. Diversification of activity flows, rapid cost adjustment, negotiation with lenders, reversible micro-investments, and rapid inventory turnover contribute positively to business continuity. These findings indicate that survival does not depend solely on the level of indebtedness, but above all on how available resources are mobilized, reorganized, and adapted to circumstances. By contrast, mutual support networks have no statistically established effect, suggesting that relational support does not systematically provide sufficient protection when the resources of relatives, suppliers, or partners remain limited. This unexpected finding highlights the need for further research into the limitations of social capital as a lever for resilience within the specific context of the economy of resourcefulness.

Taken together, the results confirm that indebtedness can remain manageable when accompanied by adjustment capacities, but becomes more risky when the entrepreneur has limited room for maneuver to absorb shocks and preserve liquidity.

The results relating to business owners' characteristics complement this interpretation by showing that age is negatively associated with resilience, while education level and income exert positive influences. Gender and location have no statistically established effects, indicating that differences in survival are related more to management and adaptation capacities than to these characteristics. These findings imply that policies supporting informal microenterprises should not be limited to facilitating access to credit. They should also support income diversification, flexible cost management, negotiation of repayment schedules, improvement in inventory turnover, and the use of small-scale and easily

reversible investments. Preventing over-indebtedness requires financial training mechanisms adapted to the realities of informality, where income is irregular and financial decisions are made under conditions of urgency. This research provides evidence that the resilience of informal microenterprises depends not only on financial resources and capabilities but also on everyday tactical practices. While these findings offer important insights into how informal microenterprises mobilize limited resources in the Moroccan context, they also open several avenues for future research. First, although our bounded resilience score (1-5) was modeled using a GLM Gamma specification, future research could assess the robustness of these findings using alternative estimators specifically designed for bounded outcomes, such as Beta regression or fractional logit models (Ferrari & Cribari-Neto, 2004; Smithson & Verkuilen, 2006). Second, the significant negative effect of age may reflect a rigidity paradox. Future studies based on larger samples could formally examine whether this relationship follows an inverted U-shaped pattern by including a squared age term (AGE^2).

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