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Article

Alternative-Data Credit Scoring and Collective Guarantee for Rural Women Entrepreneurs: Evidence from Tashkent Region, Uzbekistan

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Abstract: Rural women entrepreneurs in Uzbekistan use formal credit, but in amounts far too small to grow their businesses. In the first half of 2025, women in Tashkent region received two thirds of all business loans by number but only 22.2% by value, and the average loan to a woman was about seven times smaller than the average loan to a man. This paper argues that the main cause is the reliance of bank lending on collateral and credit history, and proposes a mechanism that replaces them with alternative data and social capital. The empirical base consists of a survey of 365 women entrepreneurs in rural districts of Tashkent region, an OLS model of monthly income, and two macro-level models built on official statistics for 2018–2025. The micro model ($R^2 = 0.676$) shows that business experience ($\beta = 0.504$, $p < 0.01$) and age ($\beta = 0.085$, $p < 0.05$) raise income, that location in the districts closest to the capital adds 3.4–4.3 income units, and that businesses financed by bank credit earn more ($\beta = 2.805$, $p < 0.1$). The macro model shows that a 1% increase in real credit is associated with a 1.6% increase in the number of women individual entrepreneurs ($R^2 = 0.915$). Based on these results, the paper proposes a five-block alternative-data scoring system with a 100-point decision scale, combined with a collective guarantee of 5–7 women organised at the mahalla level. The mechanism was tested with two pilot enterprises, which received collateral-free loans of 12 and 18 million UZS. The cost-benefit assessment of the wider support model (NPV = 2.10 billion UZS; BCR = 1.68; payback of about two years) indicates that the approach is economically justified.

Keywords: Women's entrepreneurship; rural development; access to finance; alternative data; credit scoring; collective guarantee; Uzbekistan.

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1. Introduction

Women's entrepreneurship in Uzbekistan has expanded quickly in recent years. According to UNDP (2025), the number of women entrepreneurs reached about 2.1 million in 2024, a sevenfold increase compared with 2020. At the same time, women account for only about 17% of entrepreneurs in the formal corporate sector (Ministry of Investment, Industry and Trade, 2025). As of 1 January 2025, women headed 43,860 small enterprises and microfirms, only 12.2% of all operating small businesses in the country (National Statistics Committee, 2025a, 2025b). Most new women entrepreneurs therefore operate as self-employed individuals or in very small household-based activities.

Access to finance is a central reason for this gap, but the problem is not a simple lack of loans. Central Bank data for the first half of 2025 show that women received 21,801 of the 32,628 business loans issued in Tashkent region, or 66.8% by number. However, these loans totalled 1,188.6 billion UZS, only 22.2% of the region's business lending. The average

loan to a woman was 54.5 million UZS, compared with 383.8 million UZS for a man (Central Bank of the Republic of Uzbekistan, 2025). Nationwide, about 427 thousand women received 23.36 trillion UZS of credit in 2025, while the preferential "Women's Notebook" programme provided an average of only 9.5 million UZS per borrower (Committee on Family and Women, 2025, 2026). Women thus have access to credit, but mostly to small loans that cannot finance real growth.

The reason lies in how banks assess risk. Standard scoring models rely on financial statements, credit history and liquid collateral. Rural women rarely own land or housing in their own name and many have never borrowed from a bank, so they are excluded from larger loans regardless of the quality of their projects. The international literature offers two partial solutions: scoring based on alternative data, which uses verifiable digital and transactional records (Berg et al., 2020; Björkegren & Grissen, 2020), and joint-liability lending, in which social ties replace physical collateral (Besley & Coate, 1995; Ghatak & Guinnane, 1999). Each has limits when used alone.

This paper combines the two approaches into one mechanism adapted to rural Uzbekistan. It pursues three objectives: (1) to identify, on survey and official data, the factors that shape the income and growth of rural women's enterprises in Tashkent region; (2) to design an alternative-data credit scoring system suited to the information that rural women actually generate; and (3) to propose a collective guarantee mechanism that reduces dependence on physical collateral, and to test both in practice.

The paper is structured as follows. Section 2 reviews the literature. Section 3 describes the data and methods. Section 4 presents the empirical results, the proposed mechanism and its pilot testing. Section 5 discusses the findings, and Section 6 concludes with policy recommendations.

Information asymmetry and the gender gap in credit

Most work on small business finance starts from the theory of credit rationing under asymmetric information. Stiglitz and Weiss (1981) showed that when lenders cannot observe borrower quality, higher interest rates attract riskier applicants, so banks prefer to ration credit and to rely on collateral as a screening device. Firms that cannot pledge collateral are excluded even when their projects are viable. Later empirical work confirmed that access to finance is a binding growth constraint for small firms, especially in developing economies (Beck & Demirgüç-Kunt, 2006).

This constraint has a clear gender dimension. Using cross-country firm data, Muravyev et al. (2009) found that firms managed by women are less likely to obtain bank loans and pay higher interest rates than comparable firms managed by men. In microfinance, Agier and Szafarz (2013) found that women receive smaller loans than men with similar projects, which they describe as a glass ceiling on loan size. The Uzbek data cited above show the same pattern on a much larger scale. Brush et al. (2009) argue that such outcomes cannot be explained by individual characteristics alone; their gender-aware framework adds the household ("motherhood") and the wider institutional environment to the classic market, money and management factors.

Alternative data in credit scoring

Digital services create new information about borrowers who lack a credit history. Berg et al. (2020) showed, on more than 250,000 online purchases, that simple digital-footprint variables predict default about as well as a credit bureau score and add predictive power when combined with it. The predictive power was similar for applicants with and without a bureau score, which is directly relevant for first-time borrowers. Björkegren and Grissen (2020) reached a similar conclusion using mobile phone usage in a developing country, and Óskarsdóttir et al. (2019) found that call records and social network features improve scoring for the unbanked.

Alternative data are not free of bias. They reflect the behaviour people can afford, so applicants with fewer digital payments or less internet use may remain invisible. Since smartphone ownership is lower among women and poorer adults (World Bank, 2025), a scoring model for rural women should rely on records these women actually generate, such as trade turnover, utility and mobile payments and community membership, rather than mainly on online behaviour.

Joint liability, collective guarantees and guarantee funds

The second strand concerns substitutes for collateral. Models of joint-liability lending show that when borrowers are responsible for each other's loans, they use local information to select reliable partners, monitor each other and apply social pressure to repay (Stiglitz, 1990; Besley & Coate, 1995; Ghatak & Guinnane, 1999). Social capital thus becomes a form of collateral. The empirical record is more mixed. In a field experiment in the Philippines, Giné and Karlan (2014) found that removing group liability did not reduce repayment, suggesting that much of the benefit comes from group meetings and screening rather than from liability itself. Broader evaluations report modest average effects of microcredit on business outcomes (Banerjee et al., 2015).

At the institutional level, partial credit guarantee schemes share risk between lenders, borrowers and a third party. Their design varies widely across countries (Beck et al., 2010), and their effectiveness depends on pricing, coverage and governance (Honohan, 2010). Columba et al. (2010) found that mutual guarantee institutions help small firms obtain credit on better terms, mainly because they bring local information into the lending decision.

Research gap

Three gaps follow from this review. First, most studies of alternative-data scoring are based on online consumer lending in middle- and high-income markets, not on rural entrepreneurs. Second, the literature on group lending and guarantee funds has developed largely separately from the scoring literature. Third, evidence on Uzbekistan is limited and mostly describes barriers rather than designing and testing financing mechanisms. This paper addresses these gaps by combining scoring and collective guarantee in one mechanism, grounding it in survey and official data from Tashkent region, and testing it in pilot enterprises. In line with new economic geography (Krugman, 2011), the study also treats rural location as a source of cost and information disadvantage rather than as a background characteristic.

2. Data and methodology

Survey data

Primary data were collected through a structured questionnaire among women entrepreneurs operating in rural districts of Tashkent region. The questionnaire was distributed through the Google Forms platform, data were collected over one month in 2025–2026, and 365 women took part. The questionnaire covered demographic characteristics (age, marital status, number of children), business characteristics (years in business, type of activity, organisational form), economic factors (source of start-up finance, perceived benefit of tax incentives, level of competition, business development problems) and spatial factors (district and distance to the regional centre). The data were processed in Stata 17.0.

The sample reflects the diversity of rural women's enterprises. By organisational form, 51.7% of respondents were registered individual entrepreneurs, 18.4% operated limited liability companies, 3.5% ran joint businesses and 26.4% worked informally. By marital status, 261 respondents were married, 49 had never married, 33 were divorced and 22 were widowed. Respondents came from 12 districts: Bekobod, Bo'ka, Chinoz, O'rta Chirchiq, Oqqo'rg'on, Parkent, Qibray, Quyi Chirchiq, Toshkent, Yangiyo'l, Yuqori Chirchiq and Zangiota.

Micro-level econometric model

To identify the factors that shape the income of women entrepreneurs, the study estimates a multiple linear regression by ordinary least squares:

$$Income_i = \beta_0 + \beta_1 Age_i + \beta_2 Distance_i + \beta_3 Children_i + \beta_4 Experience_i + \beta_5 Competition_i + \beta_6 TaxBenefit_i + \beta_7 DevProblems_i + \gamma' M_i + \delta' T_i + \theta' F_i + \lambda' D_i + \varepsilon_i$$

where Income is the respondent's monthly income; Age is age in years; Distance is distance to the regional centre in km; Children is the number of children; Experience is years in business; Competition, TaxBenefit and DevProblems are the respondent's assessments of competition, the benefit of tax incentives and business development problems; M, T, F and D are sets of dummy variables for marital status (base: divorced), absence of personal transport (base: has transport), source of start-up finance (base: other sources) and district (base: Bekobod); and ε is the error term. The null hypothesis is that none of the factors has a significant effect on income (H_0: $\beta_1 = \beta_2 = \ldots = \beta_k = 0$). Statistical significance was tested with t- and F-tests. Pairwise correlations between the explanatory variables are all below 0.5, which indicates no strong multicollinearity.

Macro-level models

To capture the overall dynamics of women's entrepreneurship in the region, the micro model is complemented by two time-series models based on official statistics for 2018–2025. The dependent variable is the number of women individual entrepreneurs in Tashkent region (Y). The explanatory variables are internet subscribers per 100 inhabitants (X_1), the female unemployment rate (X_2) and real credit outstanding in 2010 prices (X_3). Because the sample is small (n = 8) and including all factors together produced variance inflation factors above 60, the factors were split into a digital infrastructure model (A) and a financial resources model (B):

$$A: \ln Y_t = \beta_0 + \beta_1 \ln X_{1t} + \beta_2 X_{2t} + \varepsilon_t$$

$$B: \ln Y_t = \beta_0 + \beta_1 \ln X_{3t} + \beta_2 X_{2t} + \varepsilon_t$$

Credit outstanding is taken at year end and deflated with the gross regional product deflator; values for 2023–2024 were estimated by geometric interpolation between 2022 and 2025.

Design and evaluation of the mechanism

The scoring and guarantee mechanism was designed in three steps. First, the survey and Central Bank data were used to identify the main barriers and the records that rural women actually generate. Second, these records were grouped into scoring blocks whose weights were set by expert ranking. The expert group comprised four specialists representing commercial banks, microfinance organisations, the Tashkent Regional Entrepreneurship Development Centre and mahalla activists; agreement between experts was assessed with Kendall's coefficient of concordance (Kendall & Babington Smith, 1939). Third, the collective guarantee element was designed by adapting joint-liability principles (Ghatak & Guinnane, 1999) and the risk-sharing structure of partial credit guarantees (Beck et al., 2010; Honohan, 2010). The mechanism was then tested in two pilot enterprises, and the economic efficiency of the wider support model was assessed by cost-benefit analysis.

3. Results

Descriptive evidence: barriers and sources of finance

The survey confirms that formal credit plays a limited role in starting a rural woman's business. Personal savings were the most common source of start-up finance, followed by support from relatives and business partners; bank credit came fourth (Table 1).

Table 1. Main barriers to business activity by source of start-up finance, number of respondents

Barrier	Other	Bank credit	Business partner	Relatives	Personal savings	Total
Household chores	7	38	25	48	58	176
Care for elderly and children	4	12	29	18	25	88
Children's upbringing and education	6	6	11	14	20	57
Pressure from relatives	3	5	8	3	16	35
Duties to parents-in-law	1	2	1	1	4	9
Total	**21**	**63**	**74**	**84**	**123**	**365**

Note: Pearson $\chi^2 = 27.48$, $p = 0.036$. Source: author's survey, Stata 17.0.

Personal savings financed 33.7% of businesses, relatives 23.0%, partners 20.3% and bank credit only 17.3%. Household chores were the most frequent barrier (48.2% of respondents), followed by care for the elderly and children (24.1%). The chi-square test shows a statistically significant association between the type of barrier and the source of finance ($\chi^2 = 27.48$, $p = 0.036$). In other words, the family burden that women carry is linked to the way they can finance their business, which supports the gender-aware view of Brush et al. (2009).

Pairwise correlations show that monthly income is positively associated with age ($r = 0.219$, $p < 0.001$), distance to the centre ($r = 0.170$, $p = 0.001$) and the number of children ($r = 0.106$, $p = 0.044$), and negatively associated with marital status ($r = -0.134$, $p = 0.010$) and the absence of personal transport ($r = -0.178$, $p = 0.001$).

Determinants of income: micro-level OLS results

Table 2 presents the OLS estimates. The model is statistically significant ($F = 4.756$, $p < 0.001$) and explains 67.6% of the variation in monthly income ($R^2 = 0.676$).

Table 2. OLS estimates of the determinants of monthly income of women entrepreneurs (n = 365)

Variable	Coef.	Std. error	t	p
District (base: Bekobod)				
Bo'ka	−0.721	1.728	−0.42	0.677
Chinoz	0.552	1.494	0.37	0.712
O'rta Chirchiq	1.315	1.419	0.93	0.355
Oqqo'rg'on	0.970	1.383	0.70	0.483
Parkent	2.638	1.607	1.64	0.102
Qibray	3.365**	1.565	2.15	0.032
Quyi Chirchiq	2.589*	1.463	1.77	0.078
Toshkent	4.278***	1.565	2.73	0.007
Yangiyo'l	1.725	1.599	1.08	0.281
Yuqori Chirchiq	−0.936	1.557	−0.60	0.548
Zangiota	−0.174	1.610	−0.11	0.914
Individual and business factors				
Age	0.085**	0.041	2.08	0.038
Distance to centre	0.047	0.050	0.94	0.346
Number of children	−0.204	0.279	−0.73	0.464
Years in business	0.504***	0.093	5.45	0.000
Competition	0.016	0.017	0.95	0.345
Benefit of tax incentives	−0.016	0.015	−1.07	0.288
Business development problems	−0.686**	0.309	−2.22	0.027
Marital status (base: divorced)				

Variable	Coef.	Std. error	t	p
Widowed	−1.443	1.624	−0.89	0.375
Married	−1.344	1.092	−1.23	0.219
Never married	−2.555*	1.340	−1.91	0.057
Personal transport (base: has transport)				
No personal transport	−0.933	0.677	−1.38	0.169
Source of finance (base: other)				
Bank credit	2.805*	1.513	1.85	0.065
Business partner	2.047	1.432	1.43	0.154
Relatives	1.678	1.404	1.20	0.233
Personal savings	0.490	1.364	0.36	0.720
Constant	5.009*	2.808	1.78	0.075
Mean / SD of dependent variable	10.066 / 6.262			
R^2	0.676			
F-test (Prob > F)	4.756 (0.000)			
AIC / BIC	2312.138 / 2421.335			

Note: *** p < 0.01, ** p < 0.05, * p < 0.1. Source: author's calculations in Stata 17.0.

Experience is the strongest driver of income: each additional year in business raises monthly income by 0.504 units on average (p < 0.01). Age also has a positive effect (β = 0.085, p = 0.038). Location matters as well. Compared with Bekobod, the most peripheral district in the sample, women in Toshkent district earn 4.278 units more (p = 0.007) and women in Qibray 3.365 units more (p = 0.032), with Quyi Chirchiq significant at the 10% level. Business development problems reduce income (β = −0.686, p = 0.027), and never-married women earn less than the reference group (p = 0.057).

The financing variables are the most relevant for this paper. Businesses started with bank credit earn 2.805 units more than those financed from other sources (p = 0.065), while the coefficient for personal savings is small and insignificant. This suggests that access to formal credit, not only the size of a woman's own resources, is associated with higher income. By contrast, distance to the centre, the number of children, competition and tax incentives have no significant effect. The main hypothesis is therefore partly confirmed: income depends mostly on experience, location and access to finance, while tax incentives do not make a measurable difference.

Macro-level evidence: credit and digital infrastructure

The macro models confirm the role of finance at the regional level (Table 3).

Table 3. Macro-level regression results, Tashkent region, 2018–2025

Indicator	Model A	Model B
Constant	8.299*** (0.168)	−3.333 (2.647)
ln X_1 – internet coverage	0.304*** (0.035)	–
ln X_3 – real credit outstanding	–	1.612*** (0.328)
X_2 – female unemployment rate	−0.0251*** (0.0055)	−0.0416*** (0.0084)
R^2 / adjusted R^2	0.969 / 0.957	0.915 / 0.880
F-statistic (p)	79.04 (0.000)	26.78 (0.002)
Durbin–Watson	2.44	2.06
MAPE, %	2.54	4.05
Theil's U	0.016	0.026
Observations	8	8

Note: standard errors in parentheses; *** p < 0.01. Source: author's calculations based on official statistics.

In Model B, a 1% increase in real credit outstanding is associated with a 1.6% increase in the number of women individual entrepreneurs. In Model A, a 1% increase in internet coverage is associated with a 0.30% increase, and a one percentage point fall in female unemployment with a 2.5% increase. Diagnostic tests show no multicollinearity (VIF = 1.21 and 1.01), heteroscedasticity (Breusch–Pagan and White, $p > 0.23$), autocorrelation (Breusch–Godfrey, $p > 0.42$) or non-normal residuals (Jarque–Bera and Shapiro–Wilk, $p > 0.66$), and the Ramsey RESET test supports the specification ($p > 0.24$). When Model B is re-estimated only on official observations ($n = 6$), the credit ($\beta = 1.547$, $p = 0.032$) and unemployment ($\beta = -0.038$, $p = 0.042$) coefficients remain significant. Because the coefficients lose significance when a time trend is added, these results are interpreted as stable statistical associations rather than causal effects.

The micro and macro results point in the same direction. At the individual level, women who started with bank credit earn more; at the regional level, growth in credit is associated with growth in the number of women entrepreneurs. Two independent data sources therefore indicate that access to finance is a priority channel for developing rural women's entrepreneurship.

Alternative-data credit scoring system

Given that collateral and credit history are the main barriers, the proposed mechanism bases the credit decision on two pillars: records that confirm a woman's regular economic activity, and the social guarantee provided by her mahalla and group. Scoring indicators are combined into five blocks (Table 4).

Table 4. Alternative-data scoring system for rural women entrepreneurs

Block	Main indicators	Data source	Weight, %
1. Trade activity	Stability of monthly sales; number of POS-terminal and online payments	Commercial bank, payment systems, WEFP	30
2. Digital payment discipline	Timely payment of mobile, utility and other regular bills	Mobile operators, payment systems	20
3. Social capital	Mahalla recommendation; membership in a cooperative or mutual help group	Mahalla, cooperative	25
4. Business experience and skills	Years in business; completed financial literacy training	Tax authority, ATIM	15
5. Family support	Family members' involvement in the business; arranged childcare	Application and interview	10
Total			**100**

Note: WEFP – Women Entrepreneur Finance Portal; ATIM – Women's Entrepreneurship Infrastructure Centre. Source: developed by the author.

More than half of the weight (55%) falls on trade activity and social capital, the two blocks that best reflect repayment capacity and responsibility when collateral and credit history are absent. The experience block is included because the OLS model identified years in business as the strongest determinant of income, and the family support block reflects the barriers shown in Table 1. Each block is assessed on three levels using criteria that can be verified through the bank and the mahalla (Table 5).

Table 5. Assessment criteria for the scoring blocks

Block	High (100 points)	Medium (50 points)	Low (0 points)
Trade activity	Stable monthly revenue over the last 6 months; POS or online payments every month	Seasonal fluctuations; digital payments partly present	No data confirming revenue
Digital payment discipline	No delays in regular payments over the last 12 months	1–2 delays	3 or more delays, or no data
Social capital	Both a mahalla recommendation and cooperative or group membership	One of the two	Neither
Experience and skills	More than 3 years in business, or completed financial literacy training	1–3 years in business	Less than 1 year and no training
Family support	Family members involved in the business and childcare arranged	One of the two	Neither

Source: developed by the author.

The total score is calculated as:

$$S = \sum_{i=1}^{5} w_i \cdot b_i, \qquad \sum_{i=1}^{5} w_i = 1$$

where S is the total score (0–100), w_i is the weight of block i and b_i is the score for block i (0, 50 or 100). Applicants scoring 70 or more receive a collateral-free loan on standard terms; applications scoring 50–69 are considered under the collective guarantee; applicants below 50 first complete financial literacy and business planning training at an ATIM and are then reassessed. Instead of a refusal, the woman is prepared for credit. For example, an applicant with 100 points for trade activity, 50 for payment discipline, 100 for social capital, 50 for experience and 0 for family support obtains S = 0.30·100 + 0.20·50 + 0.25·100 + 0.15·50 + 0.10·0 = 72.5 and qualifies for a collateral-free loan.

Collective guarantee mechanism

For applicants in the 50–69 range, the collective guarantee replaces physical collateral. Groups of 5–7 women are formed at the mahalla level. Members guarantee each other's loan obligations, and the mahalla women's activist provides a recommendation based on each member's social profile. Each group forms a guarantee fund equal to 5–10% of the loan amount, which is returned to members once the loan is fully repaid. The group's access to further loans depends on all members meeting their obligations on time. In case of default, losses are covered in a fixed order: first the group's guarantee fund, then the members' shared liability, and finally the guarantee of the State Fund for Support of Entrepreneurial Activity (Figure 1).

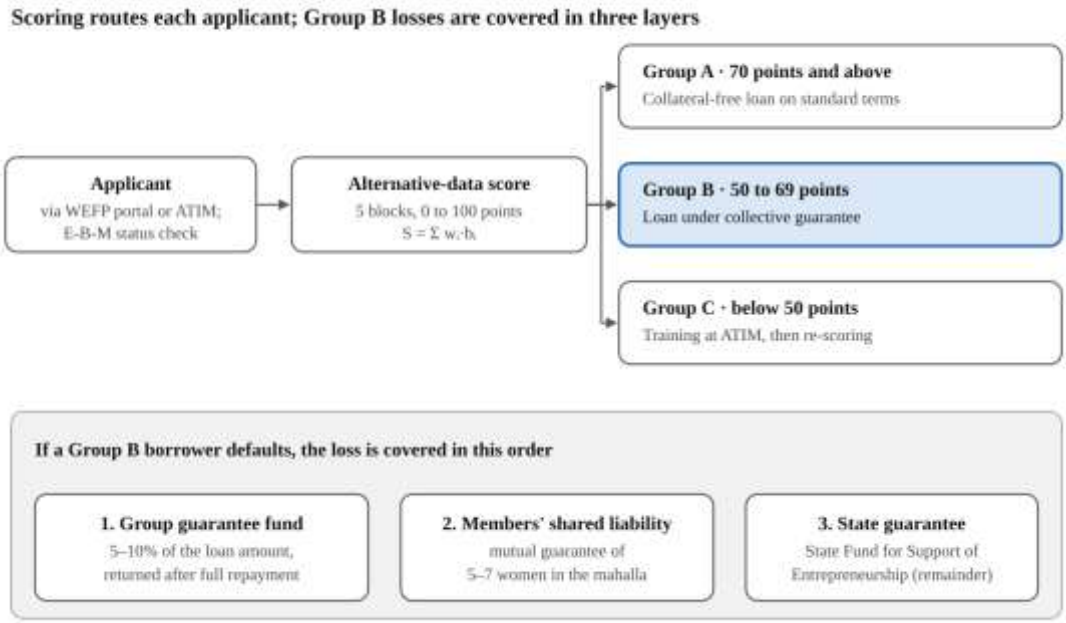


Figure 1. The proposed scoring and collective guarantee mechanism. Source: developed by the author.

The mechanism works in five stages: the applicant applies through the WEFP portal or an ATIM; her status is determined by the E-B-M criteria (ownership, management and labour); alternative data are collected and the score is calculated; depending on the score band, a collateral-free loan, a guaranteed loan or a preparation programme is recommended; and repayment is monitored through the portal and used in later assessments. To keep the system reliable, overdue rates are tracked for each score band during the first 12 months of the pilot. If they exceed 3% in the 70+ band or 7% in the 50–69 band, block weights and thresholds are revised. Mobile and payment data are collected only with the applicant's written consent, in line with the Law on Personal Data (Republic of Uzbekistan, 2019).

Pilot testing

The proposed mechanisms were tested in two women-led enterprises representing different zones of the region (Table 6).

Table 6. Results of pilot testing

Indicator	**"Lola" (Bekobod district, peripheral zone)**	**"Massive Exclusive" (Toshkent district, central zone)**
Activity	Medical services	Trade
Organisational form	Private small enterprise	Moved from informal activity to registered individual entrepreneur
Financing mechanism	Collateral-free microloan under collective guarantee	Working capital loan based on alternative scoring
Loan amount (2025)	18 million UZS	12 million UZS
Digital integration	WEFP online ordering system	WEFP e-market module
Main result	Monthly sales up 28%; services extended to 4 mahallas; 2 additional women employees hired	Gained access to state programmes, tax incentives and credit through formalisation

Source: author's pilot data.

Neither enterprise had collateral, yet both obtained formal credit. In "Lola", the collateral-free loan combined with digital ordering raised monthly sales by 28% and

created two jobs for women. In "Massive Exclusive", formalisation opened access to credit and state support that had been unavailable in the informal sector.

Economic efficiency

The scoring and guarantee mechanism is designed to operate within a wider support model that includes ATIM centres and the WEFP digital portal. The economic efficiency of this model was assessed by cost-benefit analysis over three years:

$$NPV = \sum_{t=1}^{3} \frac{B_t - C_t}{(1+d)^t} - I_0, \qquad BCR = \frac{\sum_{t=1}^{3} B_t/(1+d)^t}{I_0 + \sum_{t=1}^{3} C_t/(1+d)^t}$$

The discount rate equals the Central Bank policy rate of 14%. Initial investment (I_0 = 1,481.2 million UZS) covers development of the WEFP portal (411.2 million UZS) and equipment for three ATIM centres (1,070 million UZS); annual operating costs are 687.8 million UZS. Benefits include the additional income of women entrepreneurs (a conservative 20% income growth, half of it attributed to the centres), additional turnover tax and savings on social assistance as some families leave the low-income register.

Table 7. Cost-benefit analysis of the support model, million UZS

Indicator	Year 0	Year 1	Year 2	Year 3	Total
Investment (I_0)	1,481.2	–	–	–	1,481.2
Operating costs (C_t)	–	687.8	687.8	687.8	2,063.3
Women covered, persons	–	180	360	540	–
Total benefit (B_t)	–	758.9	2,529.6	3,794.4	7,082.9
Net cash flow	−1,481.2	71.1	1,841.9	3,106.7	3,538.4
Discounted net cash flow (d = 14%)	−1,481.2	62.4	1,417.2	2,096.9	2,095.3 (NPV)

Source: author's calculations based on Central Bank, National Statistics Committee data and Tax Code rates.

Discounted benefits amount to 5.17 billion UZS and discounted costs to 3.08 billion UZS, giving NPV = 2.10 billion UZS and BCR = 1.68: each som spent returns 1.68 som of benefit, and the investment pays back in about two years. A sensitivity analysis shows that the project remains viable (BCR > 1) as long as each centre covers at least 40 women per year and at least half of the income growth is attributable to the centres.

4. Discussion

The results support the view that the main obstacle for rural women entrepreneurs in Tashkent region is institutional rather than a lack of demand or business potential. Women do borrow, but the collateral-based lending model limits them to small loans: the sevenfold gap in average loan size between women and men is consistent with the credit rationing logic of Stiglitz and Weiss (1981) and with cross-country evidence on women-managed firms (Muravyev et al., 2009; Agier & Szafarz, 2013). The positive association between bank credit and income at the individual level, and between credit and the number of women entrepreneurs at the regional level, suggests that easing this constraint can have a real economic effect.

The OLS results also shape the design of the scoring system. Experience is the strongest driver of income, so it enters the score directly, while tax incentives, often the main instrument of support policy, show no significant effect. This supports shifting part of public support from tax benefits towards access to finance and training. The significant district effects show that women in peripheral districts such as Bekobod start from a weaker position, which is why the mechanism offers a preparation track at ATIM centres instead of a refusal for low-scoring applicants.

The scoring system follows the main finding of Berg et al. (2020) that alternative data complement traditional information and make unscorable applicants visible. It differs from online digital-footprint models by giving the highest weight to trade activity and

social capital, records that rural women generate even without a smartphone or an online shop. This addresses the concern that purely digital data could reproduce the gender gap in mobile and internet use (World Bank, 2025). The collective guarantee draws on joint-liability theory but limits each member's exposure through a small fund and a state guarantee layer. Given the evidence that the value of group lending lies largely in screening and peer support rather than in unlimited liability (Giné & Karlan, 2014), this layered design keeps the benefits of group lending while sharing risk with a third party, as in mutual guarantee institutions (Columba et al., 2010).

The study has several limitations. The survey data are cross-sectional and based on self-reported income, and the bank credit coefficient is significant only at the 10% level. The macro models rest on eight annual observations and partly interpolated credit data, so they show associations rather than causal effects. The scoring weights are expert-based and must be validated on actual repayment data, and the pilot covered only two enterprises. Future research could test the mechanism through a phased rollout across districts, which would allow a causal estimate of its effect on credit access, loan size and business growth.

5. Conclusion and policy recommendations

The rapid growth in the number of women entrepreneurs in Uzbekistan has not been matched by access to credit of adequate size. In Tashkent region, women receive two thirds of business loans by number but less than a quarter by value. Survey evidence from 365 women entrepreneurs shows that experience, location and access to bank credit shape their income, and official statistics show that credit growth is associated with growth in the number of women entrepreneurs.

The paper proposes a mechanism that replaces collateral and credit history with alternative data and social capital. A five-block scoring system with a 100-point decision scale assesses trade activity, payment discipline, social capital, experience and family support, while a collective guarantee of 5–7 women with a layered loss-coverage structure supports applicants in the middle band. Pilot testing in two enterprises confirmed that women without collateral can obtain formal credit under this mechanism, and the cost-benefit analysis of the wider support model (NPV = 2.10 billion UZS; BCR = 1.68) shows that the approach is economically justified.

The following recommendations follow from the analysis:

1. **Commercial banks** should introduce a separate scoring track for women borrowers without collateral or credit history, accepting verified trade, payment and mahalla data in the credit assessment.
2. **The Central Bank and the credit bureau** should allow utility and telecom payment histories to be included in credit reports with the borrower's written consent and under the Law on Personal Data.
3. **The State Fund for Support of Entrepreneurial Activity** should provide the final guarantee layer for loans issued under the collective guarantee, with pricing tied to the observed overdue rates.
4. **The Tashkent Regional Entrepreneurship Development Centre** should coordinate the formation of guarantee groups, verify alternative data and run preparation programmes for applicants scoring below 50 points.
5. **Policymakers** should shift part of support from tax incentives, which showed no measurable effect on income, towards guarantee funds, training and digital infrastructure.

Implemented together, these measures can help rural women move from small, informal businesses to registered enterprises with access to growth finance, and contribute to more inclusive regional development in Uzbekistan.

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