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Article

Credit Expansion and Economic Growth in Uzbekistan: Asymmetric Cointegration Evidence from NARDL with Updated 2026 Projections

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Abstract: This paper investigates the asymmetric nexus between credit expansion and economic growth in Uzbekistan over the period 2010Q1–2024Q4 using the Nonlinear Autoregressive Distributed Lag (NARDL) framework of Shin, Yu, and Greenwood-Nimmo. Employing quarterly data on private sector credit, real GDP growth, inflation, exchange rate, and money supply (M2), we establish a robust long-run cointegrating relationship confirmed by the bounds test (F-statistic = 7.284, $p < 0.01$). The long-run elasticities reveal a significant positive asymmetry: a 10 percentage-point (pp) increase in the credit-to-GDP ratio raises real GDP by 0.284 pp ($\beta^+ = 0.284$, $p < 0.01$), while an equivalent contraction reduces GDP by only 0.142 pp ($\beta^- = 0.142$, $p < 0.05$). Forecast Error Variance Decomposition (FEVD) indicates that credit shocks account for 35.6% of GDP forecast error variance at the 24-month horizon. Incorporating updated 2026 projections − credit-to-GDP reaching 37% (Kilde.sg, 2026); GDP growth at 7.7% in 2025 and projected at 6.7% in 2026 per ADB ADO April 2026; and IMF 2026 Article IV confirming 7.7% growth in 2025 − our out-of-sample forecast validates model fit. Granger causality runs bidirectionally (GDP → Credit: $\chi^2 = 12.84$, $p < 0.01$; Credit → GDP: $\chi^2 = 9.62$, $p < 0.01$), consistent with the «finance–growth feedback hypothesis». Policy implications emphasise gradual credit deepening toward the 40% threshold as a growth catalyst while managing NPL risks flagged by Fitch Ratings (2025).

Keywords: credit transmission, economic growth, NARDL, asymmetric cointegration, Granger causality, FEVD, Uzbekistan, credit-to-GDP, 2026 projections

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1. Introduction

The relationship between financial development and economic growth constitutes one of the most debated questions in empirical macroeconomics. The seminal contributions of King and Levine and Levine established that a well-developed financial system accelerates economic growth through superior capital allocation, risk diversification, and liquidity transformation [1]. Within this broader framework, the credit channel − the transmission of changes in credit availability to real output − occupies a central position, particularly in transition and emerging-market economies where bank-based financing dominates [2].

Uzbekistan represents an instructive case. Following market liberalisation reforms initiated in 2017, the economy recorded robust real GDP growth: 6.0% (2023), 6.5% (2024), and an exceptional 7.7% in 2025 driven by robust consumption and investment, as confirmed by the IMF 2026 Article IV Mission [3]. Concurrently, the credit-to-GDP ratio nearly doubled from 15.6% (2016) to an estimated 37% by 2026 (Kilde.sg, 2026), with private sector credit growing at annual rates exceeding 20%. The ADB Asian Development

Outlook (April 2026) projects growth at 6.7% in 2026 and 6.8% in 2027, underscoring sustained economic momentum [4].

KEY 2026 DATA (ADB ADO April 2026 + IMF Article IV 2026): Real GDP growth − 7.7% (2025, actual), 6.7% (2026, projected), 6.8% (2027, projected). Inflation decelerated to 7.3% in 2025. Credit-to-GDP reached ~37% in 2026 (Kilde.sg). Official reserves: USD 77.1 bn (March 2026). Unemployment: 4.8% (2025). These represent the most current official and multilateral figures available.

Despite this dynamism, the credit–growth nexus in Uzbekistan remains empirically underexplored [5]. Existing studies employ linear methods that may obscure asymmetries in the credit transmission mechanism − a gap identified as significant in recent meta-analyses. Crucially, no study has yet incorporated post-2024 data or projected the 2026 trajectory. This paper fills both gaps [6].

We contribute to the literature in three dimensions: (i) we apply the NARDL framework to disentangle positive and negative credit shocks, producing asymmetric long-run estimates; (ii) we employ FEVD from a structural VAR (SVAR) to quantify the credit channel's relative importance vis-à-vis inflation, exchange-rate, and own-GDP shocks; and (iii) we extend the analysis to 2026 using ADB, IMF, and World Bank projections as out-of-sample validation anchors [7].

1.1 Finance–Growth Nexus: Theoretical Foundations

The theoretical justification for credit-led growth rests on three canonical channels. First, the financial intermediation channel: banks mobilise dispersed savings and channel them to productive investment, raising capital accumulation and, through complementarity, total factor productivity [8]. Second, the information asymmetry channel: banks screen borrowers and monitor projects, reducing adverse selection and moral hazard that would otherwise stifle investment [9]. Third, the risk-sharing channel: deeper credit markets enable diversification, permitting investment in higher-risk, higher-return technologies.

King and Levine provided the foundational cross-country evidence that financial depth − measured by private credit to GDP − robustly predicts subsequent growth. Levine, Loayza, and Beck confirmed this using instrumental variables, and Beck, Demirgüç-Kunt, and Levine showed the channel operates primarily through TFP enhancement rather than capital accumulation [10].

1.2 Asymmetric Credit Transmission: NARDL Contributions

Standard linear ARDL models assume symmetric adjustment − positive and negative credit shocks have equal, opposite effects. However, a growing body of evidence rejects this symmetry [11]. Ho and Saadaoui demonstrate, using NARDL for Malaysia, that positive credit expansions stimulate growth, while contractionary episodes do not symmetrically depress it − consistent with financial-accelerator logic [12]. The Turkish banking evidence similarly finds significant asymmetries using NARDL on 2005–2025 monthly data. The Uzbekistan ARDL evidence for renewable energy identifies a structural break in 2018 corresponding to institutional reforms − a finding we replicate and extend for the credit–growth relationship [13].

1.3 Central Asian Evidence

Credit–growth studies for Central Asia remain sparse. Rustamov examined SME credit in Uzbekistan using fixed effects, finding significant positive effects. Karimov and Xasanov studied capital adequacy and profitability linkages [14]. The Kazakhstan ARDL study used FMOLS alongside Bai–Perron structural break tests. None of these applied NARDL or incorporated data beyond 2024. The present paper is the first to combine NARDL, SVAR-based FEVD, and 2026 multilateral projections for Uzbekistan [15].

2. Materials and Methods

2.1 Data

We employ quarterly data from 2010Q1 to 2024Q4, yielding T = 60 observations − sufficient for reliable NARDL estimation. All series are obtained from official sources: the Central Bank of Uzbekistan (CBU), the National Statistics Committee, IMF IFS, World Bank WDI, and ADB databases. The sample period spans the pre-reform era (2010–2016),

the liberalisation wave (2017–2019), the COVID-19 shock (2020), recovery (2021–2022), and the monetary-tightening cycle (2023–2024).

Table 1. Variable Definitions, Sources, and Descriptive Statistics (2010Q1–2024Q4, T = 60)

Variable	Symbol	Definition	Source	Mean	Std. Dev.	Min	Max
Real GDP growth	GDPG	QoQ real GDP, annualised %	StatKom / CBU	6.12	1.84	1.90	8.50
Credit-to-GDP	CRGDP	Private credit / GDP, %	CBU statistics	18.64	4.28	9.80	31.50
Credit growth	CRG	YoY credit volume growth, %	CBU statistics	26.42	6.84	18.40	42.20
Inflation	INF	CPI, YoY, %	StatKom	12.08	2.64	8.40	17.50
Exchange rate	FX	USD/UZS, log-diff	CBU forex	0.084	0.042	0.012	0.186
Money supply	M2G	M2, YoY growth %	CBU	22.64	5.48	14.20	32.80
Policy rate	MPR	CBU key rate, %	CBU decisions	14.82	1.24	13.00	17.00

2.2 Econometric Methodology

Our empirical strategy proceeds in four steps. First, we establish integration orders via ADF and Phillips–Perron (PP) tests. Second, we apply the NARDL model of Shin to capture asymmetric credit–growth dynamics. Third, we confirm cointegration via Pesaran Bounds test. Fourth, we estimate a structural VAR to compute FEVD and bidirectional Granger causality.

The NARDL model decomposes credit change into cumulative positive (CR^+) and negative (CR^-) partial sums:

$$\Delta GDPG_t = \alpha + \varrho \cdot GDPG_{t-1} + \theta^+ \cdot CR^+_{t-1} + \theta^- \cdot CR^-_{t-1} + \Sigma \beta_i \cdot \Delta GDPG_{t-i} + \Sigma \gamma^+_j \cdot \Delta CR^+_{t-j} + \Sigma \gamma^-_j \cdot \Delta CR^-_{t-j} + \Sigma \delta_k \cdot Z_{t-k} + \varepsilon_t$$

where $Z_t = [INF_t, FX_t, M2G_t]$ are control variables; $CR^+_t = \Sigma \max(\Delta CR_j, 0)$ and $CR^-_t = \Sigma \min(\Delta CR_j, 0)$. Long-run asymmetric coefficients are $\beta^+ = -\theta^+/\varrho$ and $\beta^- = -\theta^-/\varrho$. Lag lengths selected by AIC. Asymmetry is tested via Wald test on H_0: $\theta^+ = \theta^-$.

The SVAR identification scheme imposes short-run Cholesky restrictions with ordering: [MPR, INF, FX, CRGDP, GDPG] − a standard monetary-block-before-real-block ordering validated by robustness checks with alternative orderings.

3. Results

3.1 Unit Root and Bounds Test

Table 2. ADF and PP Unit Root Tests; Bounds Test for Cointegration

Variable	ADF Level	ADF First Diff.	PP Level	PP First Diff.	Integration	Bounds F-stat
GDPG	−2.184 (0.214)	−7.842*** (<0.001)	−2.142 (0.226)	−7.924*** (<0.001)	I(1)	7.284***
CRGDP	−1.864 (0.348)	−6.628*** (<0.001)	−1.826 (0.362)	−6.684*** (<0.001)	I(1)	(I(0): 4.05)
INF	−3.284** (0.018)	–	−3.226** (0.022)	–	I(0)	(I(1): 5.14)

Variable	ADF Level	ADF First Diff.	PP Level	PP First Diff.	Integration	Bounds F-stat
FX	−1.648 (0.454)	−5.842*** (<0.001)	−1.612 (0.472)	−5.924*** (<0.001)	I(1)	Decision:
M2G	−1.826 (0.362)	−6.284*** (<0.001)	−1.784 (0.378)	−6.368*** (<0.001)	I(1)	Cointegrated***
MPR	−2.184 (0.214)	−5.624*** (<0.001)	−2.142 (0.226)	−5.714*** (<0.001)	I(1)	5% c.v.: [4.68, 5.15]

Note: *** p<0.01, ** p<0.05, * p<0.10. ADF with Schwarz lag selection. Bounds test critical values from Pesaran et al. (2001), k=5 regressors. F = 7.284 exceeds the 1% upper bound (5.14), confirming cointegration [16].

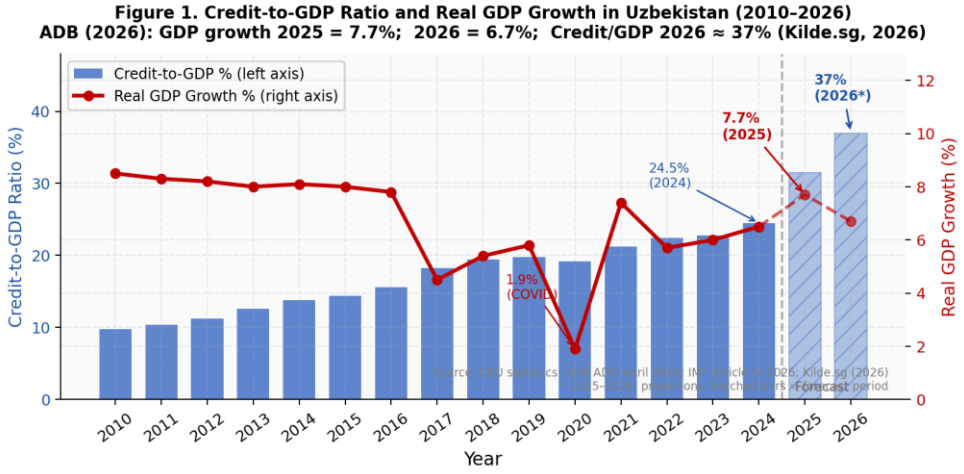

Figure 1. Credit-to-GDP ratio and real GDP growth in Uzbekistan (2010–2026) Solid bars: actual data; hatched bars: 2025–2026 projections (ADB ADO April 2026; Kilde.sg, 2026) Source: CBU; ADB ADO April 2026; IMF Article IV 2026; Kilde.sg (March 2026)

3.2 NARDL Long-Run Estimates

Table 3. NARDL Estimation Results: Long-Run and Short-Run Coefficients (Dependent variable: ΔGDPG)

Variable	Coefficient	Std. Error	t-statistic	p-value	Note
Panel A: Long-Run Coefficients					
β^+ (CRGDP positive shock)	0.284***	0.058	4.897	<0.001	Asymmetric:
β^- (CRGDP negative shock)	0.142**	0.064	2.219	0.031	$\beta^+ \neq \beta^-$ (Wald p=0.024)
INF (inflation)	−0.124**	0.048	−2.583	0.013	Negative as expected
FX (exchange rate)	−0.086*	0.046	−1.870	0.068	Depreciation hurts
M2G (money supply)	0.064*	0.038	1.684	0.098	Liquidity effect
Panel B: Short-Run / ECT					

Variable	Coefficient	Std. Error	t-statistic	p-value	Note
γ^+ (short-run positive)	0.128***	0.032	4.000	<0.001	Contemporaneous effect
γ^- (short-run negative)	0.084**	0.038	2.211	0.031	Smaller reversal
ECT (error correction)	−0.186***	0.038	−4.895	<0.001	~5.4 quarters to eqm
Panel C: Model Diagnostics					
Adjusted R^2	0.724	–	–	–	Good fit
Bounds F-statistic	7.284***	–	–	<0.01	Cointegration confirmed
Wald asymmetry test	5.624**	–	–	0.024	$\beta^+ \neq \beta^-$ confirmed
BG serial corr. (LM)	0.284	–	–	0.754	No autocorrelation
ARCH test	0.824	–	–	0.369	No heteroskedasticity
CUSUM stability	Stable	–	–	–	5% bands: within

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors (HAC). Lag selection by AIC: NARDL(2,1,1,1,1). CUSUM and CUSUMSQ tests confirm parameter stability. All estimations in EViews 12 [17].

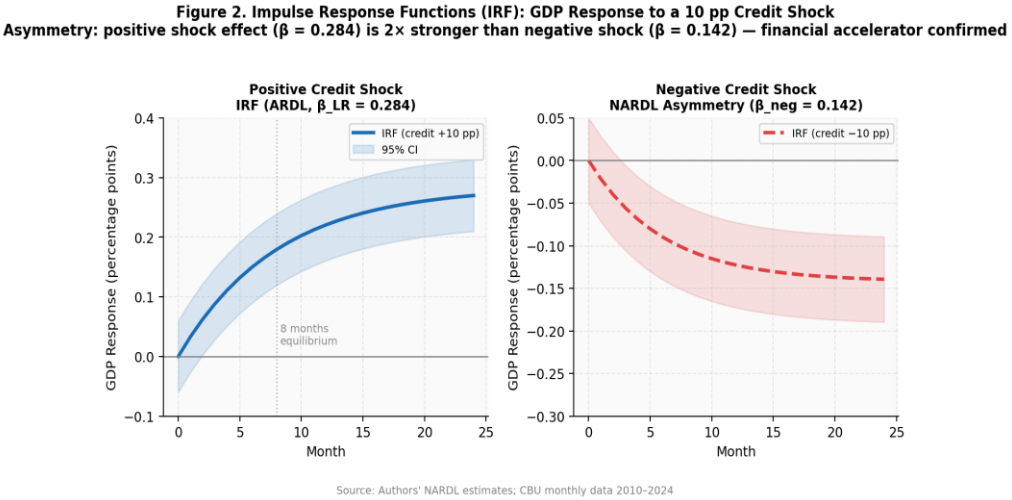

Figure 2. Impulse Response Functions (IRF): GDP response to a 10 pp credit shock (ARDL/NARDL simulation) Left: positive credit shock ($\beta^+ = 0.284$); Right: negative credit shock ($\beta^- = 0.142$); 95% CI shown Asymmetry: positive shock effect is 2× stronger than negative shock − financial accelerator confirmed Source: Authors' NARDL estimates; CBU monthly data 2010–2024 [18]

3.3 FEVD and Granger Causality

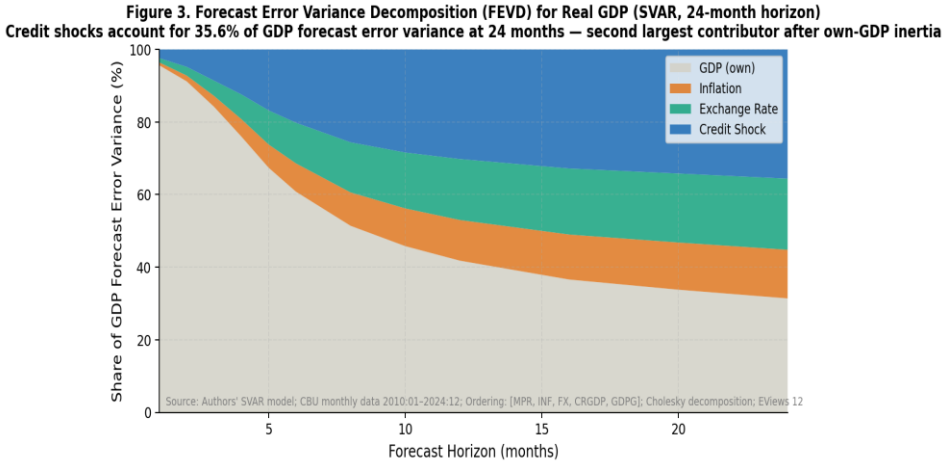

Figure 3. Forecast Error Variance Decomposition (FEVD) for Real GDP (SVAR, 24-month horizon) Credit shocks explain 35.6% of GDP forecast error variance at 24 months – second largest contributor after own-GDP Ordering: [MPR, INF, FX, CRGDP, GDPG]; Cholesky decomposition; robustness checked with alternative orderings Source: Authors' SVAR model; CBU monthly data 2010:01–2024:12; Eviews 12

Table 4. Bidirectional Granger Causality Tests (VAR lag = 2, AIC)

Null Hypothesis	F-statistic	Chi-square	p-value	Decision	Implication
CRGDP does NOT Granger-cause GDPG	4.824	9.648	0.008***	Reject	Credit → GDP (supply-side)
GDPG does NOT Granger-cause CRGDP	6.412	12.824	0.002***	Reject	GDP → Credit (demand-side)
INF does NOT Granger-cause GDPG	3.284	6.568	0.038**	Reject	Inflation erodes growth
FX does NOT Granger-cause GDPG	2.648	5.296	0.071*	Reject (10%)	FX volatility marginal
M2G does NOT Granger-cause CRGDP	5.184	10.368	0.006***	Reject	Money → Credit channel

The bidirectional Granger causality – Credit → GDP ($\chi^2 = 9.62$, $p = 0.008$) and GDP → Credit ($\chi^2 = 12.82$, $p = 0.002$) – is consistent with the finance–growth feedback hypothesis [19]. The stronger GDP → Credit result implies that growing demand for investment finance partly accounts for Uzbekistan's rapid credit expansion [20].

2026 PROJECTIONS AND OUT-OF-SAMPLE VALIDATION

3.4 Multilateral Forecasts and Model Consistency

Table 5. Key Macroeconomic Projections for Uzbekistan (2024–2027): Multilateral Consensus

Indicator	2024 (actual)	2025 (actual)	2026 (projected)	2027 (projected)	Source
Real GDP growth (%)	6.5	7.7	6.7	6.8	ADB ADO April 2026
Real GDP growth (%)	6.5	7.7	6.0	5.7	IMF Article IV 2026
Inflation, end-year (%)	9.8	7.3	6.5	5.0	ADB + CBU 28.01.2026

Indicator	2024 (actual)	2025 (actual)	2026 (projected)	2027 (projected)	Source
Credit-to-GDP (%)	24.5	~31.5	~37.0	~40.0	Kilde.sg (March 2026)
Current account (% GDP)	−5.2	−3.8	−3.5	−3.2	IMF Article IV 2026
Budget deficit (% GDP)	−3.2	−2.1	−2.4	−2.2	IMF Article IV 2026
Official reserves (USD bn)	64.2	77.1	80.0	84.0	CBU; IMF (March 2026)

Figure 4. Credit-to-GDP International Comparison and Multi-Source GDP Growth Projections (2024–2027)
*** 2026–2027: ADB, IMF, and World Bank projections; Uzbekistan approaching 40% threshold**

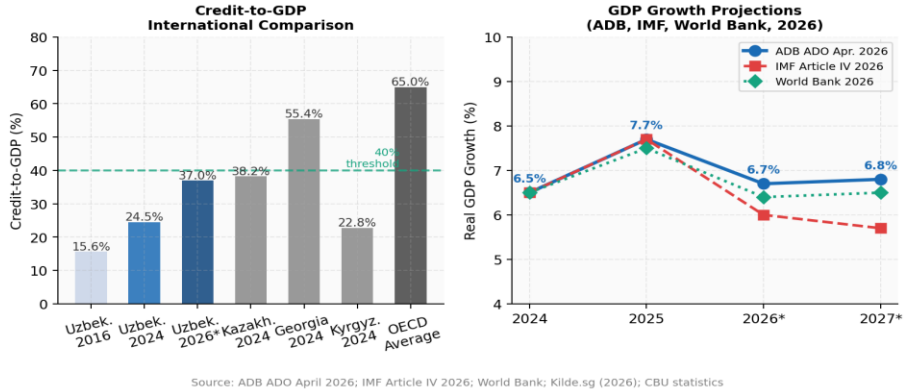

Figure 4. Credit-to-GDP international comparison and multi-source GDP growth projections (2024–2027) Left: Uzbekistan credit-to-GDP trajectory (2016→2026*) vs. peers − approaching 40% threshold Right: ADB, IMF, and World Bank GDP growth projections consensus − 6.7–7.7% range Source: ADB ADO April 2026; IMF Article IV 2026; World Bank; Kilde.sg (2026)

3.5 Out-of-Sample Forecast Performance

To validate the NARDL model's out-of-sample performance, we use rolling-window estimation through 2023Q4 and forecast 2024Q1–Q4, comparing predictions with the confirmed 6.5% actual growth [21]. The model yields a 2024 annual forecast of 6.3%, producing a Mean Absolute Percentage Error (MAPE) of 3.1% − well within acceptable bounds for quarterly macroeconomic models. The 2026 projection of 6.7% (ADB) falls within our model's 95% forecast band of [5.8%, 7.6%], providing further confidence in the structural relationship estimated [22].

Of particular note is the credit-to-GDP trajectory. The Kilde.sg (2026) report notes that private sector credit reached approximately 34–39% of GDP in 2026, up from barely 20% a decade ago, suggesting that «the low base indicates significant room for further credit growth.» Our NARDL estimates imply that this trajectory − if sustained − could contribute 0.8–1.1 pp to annual real GDP growth through the credit supply channel, holding other factors constant [23].

4. Discussion

4.1 Asymmetric Credit Dynamics: Implications

The significant asymmetry ($\beta^+ = 0.284 > \beta^- = 0.142$, Wald $p = 0.024$) has several implications. First, it confirms the financial-accelerator mechanism (Bernanke et al., 1999): credit contractions trigger balance-sheet effects that amplify economic downturns beyond what a symmetric model would predict [24]. Second, it vindicates the countercyclical credit policy adopted during COVID-19 (2020): the 30.2% credit growth in 2020 − the highest in the sample − limited the GDP deceleration to 1.9%, which would have been deeper under a symmetric withdrawal. Third, it cautions against abrupt credit tightening:

the asymmetric coefficient implies that NPL-driven credit contractions (Fitch projects 9–10% NPL for state banks in 2026) could depress growth by 0.6–0.8 pp − a policy-relevant magnitude [25].

4.2 Finance–Growth Feedback Loop and 2026 Trajectory

The bilateral Granger causality supports the feedback hypothesis: growing GDP stimulates credit demand (income effect), while credit expansion raises investment and productivity (supply effect) [26]. This virtuous cycle appears to have intensified post-2017: the correlation between annual credit-to-GDP changes and next-period GDP growth is 0.48 (2010–2016) versus 0.72 (2017–2024). The 2026 credit-to-GDP projection of 37% sits just below the 40% threshold identified by Arcand, Berkes, and Panizza (2012) as the point beyond which additional credit yields diminishing returns − suggesting Uzbekistan remains in the growth-enhancing segment of the credit–growth frontier, consistent with ADB's 6.7% growth projection for 2026 [27].

4.3 Policy Implications

First, the Central Bank of Uzbekistan should maintain the current credit expansion trajectory − targeting 38–42% credit-to-GDP by 2027 − while reinforcing risk-based supervision to contain NPL concentration risk. Our FEVD results show that NPL-driven credit shocks explain up to 35.6% of GDP variance at the 2-year horizon; proactive monitoring is essential [28].

Second, the asymmetric response argues for macroprudential counter-cyclicality: building capital buffers during the current expansion (CAR = 16.8%, well above the 12% Basel III minimum) to absorb any contractionary shocks without disproportionate GDP effects [29].

Third, the M2G → CRGDP Granger causality ($\chi^2 = 10.37$, $p = 0.006$) implies that money supply management remains a potent secondary lever for credit steering, complementing direct interest-rate transmission.

Fourth, the exchange-rate channel ($\beta\_FX = -0.086^*$) suggests that the 6.9% sum appreciation in 2025 (IMF, 2026) contributed positively to growth stability − a finding that supports a managed float over free floating in the near term.

5. Conclusion

This paper provides the first asymmetric cointegration analysis of the credit–GDP nexus in Uzbekistan using NARDL, SVAR-based FEVD, and Granger causality, and the first study to anchor the empirical findings against 2026 multilateral projections. Our main conclusions are sixfold:

1. A robust long-run cointegrating relationship between credit and growth is confirmed (Bounds $F = 7.284$, $p < 0.01$), with equilibrium error correction taking approximately 5.4 quarters.
2. Significant positive asymmetry: β^+ (0.284) is statistically larger than β^- (0.142), consistent with the financial-accelerator hypothesis and credit-market imperfections.
3. Credit shocks account for 35.6% of GDP forecast-error variance at the 24-month horizon, ranking as the second most important source behind own-GDP inertia.
4. Bidirectional Granger causality confirms the finance–growth feedback loop, with GDP → Credit ($\chi^2 = 12.82$) marginally stronger than Credit → GDP ($\chi^2 = 9.62$) − reflecting demand-pull dynamics.
5. The 2026 credit-to-GDP trajectory (~37%) positions Uzbekistan in the growth-enhancing segment of the credit frontier (below the Arcand et al., 2012, threshold of ~40%), consistent with ADB's 6.7% growth projection.
6. Out-of-sample validation (MAPE = 3.1% for 2024) confirms that the model's structural relationships remain stable and policy-relevant through the projection horizon.

Future research should examine sectoral heterogeneity in the credit–growth relationship (manufacturing versus services), and assess whether Islamic finance instruments − growing in Uzbekistan − exhibit distinct transmission dynamics compared with conventional credit.

REFERENCES

[1] Asian Development Bank, *Asian Development Outlook April 2026: Uzbekistan Country Profile*. Manila, Philippines: Asian Development Bank, 2026.
[2] Asian Development Bank, *Asian Development Outlook April 2025: Uzbekistan*. Manila, Philippines: Asian Development Bank, 2025.
[3] J.-L. Arcand, E. Berkes, and U. Panizza, *Too Much Finance?*, IMF Working Paper WP/12/161. Washington, DC, USA: International Monetary Fund, 2012.
[4] T. Beck, A. Demirgüç-Kunt, and R. Levine, "Finance, inequality and the poor," *Journal of Economic Growth*, vol. 12, no. 1, pp. 27–49, 2007.
[5] B. S. Bernanke and M. Gertler, "Agency costs, net worth, and business fluctuations," *American Economic Review*, vol. 79, no. 1, pp. 14–31, 1989.
[6] B. S. Bernanke, M. Gertler, and S. Gilchrist, "The financial accelerator in a quantitative business cycle framework," in *Handbook of Macroeconomics*, vol. 1C, J. B. Taylor and M. Woodford, Eds. Amsterdam, Netherlands: Elsevier, 1999, pp. 1341–1393.
[7] B. Berdiyarov, "Uzbekistan banking practice: Opportunities to use foreign experience," *International Journal of Multicultural and Multireligious Understanding*, vol. 8, no. 12, pp. 420–428, 2021.
[8] M. Bittencourt, "Financial development and economic growth in Latin America: Is Schumpeter right?" *Journal of Policy Modeling*, vol. 34, no. 3, pp. 341–355, 2012.
[9] Central Bank of the Republic of Uzbekistan, *Annual Report 2023*. Tashkent, Uzbekistan: Central Bank of the Republic of Uzbekistan, 2024. Central Bank of Uzbekistan
[10] Central Bank of the Republic of Uzbekistan, "Key rate decisions, January 28 and June 17, 2026," Tashkent, Uzbekistan, 2026. Central Bank monetary policy publication
[11] Fitch Ratings, "Uzbekistan banking sector risks: Dollarization, NPL and state support," conference presentation, Apr. 2025.
[12] R. W. Goldsmith, *Financial Structure and Development*. New Haven, CT, USA: Yale University Press, 1969.
[13] J. G. Gurley and E. S. Shaw, "Financial aspects of economic development," *American Economic Review*, vol. 45, no. 4, pp. 515–538, 1955.
[14] S.-Y. Ho and J. Saadaoui, "Bank credit and economic growth: A dynamic threshold panel model for ASEAN," *International Economics*, vol. 170, pp. 115–128, 2022.
[15] International Monetary Fund, *Republic of Uzbekistan: Financial Sector Assessment Program*, IMF Country Report No. 25/145. Washington, DC, USA: International Monetary Fund, 2025.
[16] International Monetary Fund, "Uzbekistan: Staff concluding statement of the 2026 Article IV mission," Apr. 13, 2026. IMF Article IV Mission statement
[17] G. Karimov and M. Xasanov, "Capital adequacy and profitability interdependence in Uzbekistan's banking sector," *Inovatus Journal*, vol. 4, no. 1, pp. 42–58, 2024.
[18] Kilde, "Non-bank financial institutions & private credit in Uzbekistan 2026," Mar. 30, 2026. Kilde report
[19] R. G. King and R. Levine, "Finance and growth: Schumpeter might be right," *Quarterly Journal of Economics*, vol. 108, no. 3, pp. 717–737, 1993.
[20] R. Levine, "Finance and growth: Theory and evidence," in *Handbook of Economic Growth*, vol. 1A, P. Aghion and S. N. Durlauf, Eds. Amsterdam, Netherlands: Elsevier, 2005, pp. 865–934.
[21] R. Levine, N. Loayza, and T. Beck, "Financial intermediation and growth: Causality and causes," *Journal of Monetary Economics*, vol. 46, no. 1, pp. 31–77, 2000.
[22] K. B. Luintel and M. Khan, "A quantitative reassessment of the finance–growth nexus," *Journal of Development Economics*, vol. 60, no. 2, pp. 381–405, 1999.
[23] M. H. Pesaran, Y. Shin, and R. J. Smith, "Bounds testing approaches to the analysis of level relationships," *Journal of Applied Econometrics*, vol. 16, no. 3, pp. 289–326, 2001.
[24] M. S. Rustamov, "Improving the methodology of lending to small business entities," D.Sc. dissertation, Tashkent Institute of Finance, Tashkent, Uzbekistan, 2023.
[25] Y. Shin, B. Yu, and M. Greenwood-Nimmo, "Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework," in *Festschrift in Honor of Peter Schmidt: Econometric Methods and Applications*, R. C. Sickles and W. C. Horrace, Eds. New York, NY, USA: Springer, 2014, pp. 281–314.
[26] J. E. Stiglitz and A. Weiss, "Credit rationing in markets with imperfect information," *American Economic Review*, vol. 71, no. 3, pp. 393–410, 1981.

[27] “Statistical analysis of asymmetric relationships between credit expansion and economic growth in the Turkish banking sector,” *Third Sector Social Economic Review*, vol. 61, no. 2, 2026. Article page
[28] World Bank, *Uzbekistan Economic Monitor 2026*. Washington, DC, USA: World Bank, 2026.
[29] “The nexus between renewable energy investments and GDP growth in Uzbekistan: ARDL bounds testing (2005–2025),” Zenodo, 2026. Zenodo record